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SOUTHEAST DRAINAGE BASINS: A COOPERATIVE STATE-FEDERAL REPORT ON WATER POLLUTION

Public Health Service
Atlanta, Georgia

1951

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For Clean Water—"One River, One Plan"

Southeast
DRAINAGE BASINS

A COOPERATIVE STATE-FEDERAL REPORT ON WATER POLLUTION

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Springfield VA 22151

FEDERAL SECURITY AGENCY

Public Health Service

259

SUMMARY REPORT ON WATER POLLUTION

Southeast Drainage Basins

Prepared by

FEDERAL SECURITY AGENCY
Public Health Service
Division of Water Pollution Control
Southeast Drainage Basins Office

1951

On the basis of information
supplied by:

Alabama Water Improvement Advisory Commission
Florida State Board of Health
Georgia Department of Public Health
Louisiana Stream Control Commission
Mississippi State Board of Health
North Carolina State Board of Health
South Carolina Water Pollution Control Authority
Tennessee Stream Pollution Control Board
Virginia Water Control Board

I

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II

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INTRODUCTION

The Federal Water Pollution Control Act, Public Law 845, passed by the 80th Congress in June of 1948, requires the Surgeon General of the Public Health Service to cooperate with other Federal agencies, with State and interstate water pollution control agencies, and with municipalities and industries in the preparation or adoption of comprehensive programs for eliminating or reducing the pollution of interstate waters and tributaries thereof, and improving the sanitary condition of surface and underground waters.

In developing these programs, due regard must be given to improvements necessary to conserve the Nation's waters for public water supplies, propagation of fish and aquatic life, recreational purposes, agricultural, industrial, and other legitimate uses.

Recognizing the fact that full technical information was not available to permit the development of such comprehensive programs immediately for most of the Nation's waters, the Public Health Service envisioned the development of these programs in two general phases. The first phase contemplated the development of a series of reports, consistent with presently available data, which would: provide a reference point for measuring progress; provide a guide to needed additional data; provide a basis for the logical development of comprehensive programs; provide a basis for approval of loans to States, interstate agencies and municipalities at such time as the Congress made available funds for this purpose; and serve to inform the public on the problem of water pollution and set forth suggestions for pollution control.

The collection of available date as of July 1, 1950, has been completed under the first phase of the program. Such data have been assembled with the cooperation of State and interstate water pollution control agencies. Through these agencies additional data have been obtained from other State officials, county and city officials and representatives of industry. Federal agencies also have been of great assistance. In order to make this information available at the earliest possible moment, these data are being presented in 15 summary-type reports covering the United States by major drainage basins. This report on the Southeast Drainage Basins is one of that series.

These summary reports present information about the ways our water resources are used, the pollution going into our water resources and the resulting damages, the benefits which may result from pollution prevention and abatement, the pollution prevention measures now in effect, and those required.

They are prepared in two parts. Part one considers the water pollution problems of the basin as a whole. Part two presents briefly the data for each of the several sub-basins of the major basin, including a list of projects now known to be needed for water pollution control.

Since the summary reports are based on data which are now readily available, these reports do not discuss or evaluate the most advantageous water uses as they are related to pollution control. Such considerations will be included as a part of the comprehensive water pollution control programs.

The deficiencies in data and the gaps in information indicated in these summary reports are as significant as the presentation of available facts and statistics. They indicate the work which still needs to be accomplished by water pollution control authorities for the preparation of comprehensive programs.

Data and knowledge now available are sufficient, however, to permit the immediate solution of many of the pollution problems within the Southeast Drainage Basins without awaiting the results of additional surveys and studies. The tabulations of pollution abatement projects which are included in part two of this summary report represent presently known needs. However, future studies and evaluations may result in some changes in the estimations of requirements.

A sincere effort has been made by all who contributed to this report to present a fair picture of the complex water pollution problems in the Southeast Drainage Basins and to present reasonable conclusions and recommendations. It is our hope that this report, as a step in the cooperative development of an ultimate comprehensive pollution control program, will help in safeguarding the water resources of the Southeast Drainage Basins.

Leonard A. Scheele

Surgeon General

ACKNOWLEDGEMENTS

The Public Health Service wishes to express its appreciation to those agencies and individuals that supplied the information upon which this report is based, reviewed the preliminary draft, and submitted helpful comments.

The following water pollution control agencies of the States in the Basins have furnished the data from which the various tables on pollution were prepared and other data and information contained in the narrative statements:

Alabama Water Improvement Advisory Commission
Florida State Board of Health
Georgia Department of Public Health
Louisiana Stream Control Commission
Mississippi State Board of Health
North Carolina State Board of Health
South Carolina Water Pollution Control Authority
Tennessee Stream Pollution Control Board
Virginia Water Control Board

In general, the report has been revised so that it is in agreement with the comments and suggestions of the State agencies.

Federal agencies from which assistance was obtained include: Corps of Engineers, Department of the Army; Geological Survey, Fish and Wildlife Service, and National Parks Service, Department of Interior; Bureau of the Census, Department of Commerce; Soil Conservation Service, Department of Agriculture; Federal Power Commission; and Community Facilities Service, General Services Administration.

Finally, there is acknowledged the assistance of other State agencies and individuals interested in water resources development and conservation, that have contributed information.

SUMMARY

The Southeast Drainage Basins include all the river systems discharging into the Atlantic Ocean or the Gulf of Mexico from the Rappahannock River in Virginia to and including the Pearl River in Mississippi. The total area of the drainage basins is 282,652 square miles, about one-tenth the area of continental United States. The area includes part or all of the States of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Tennessee and West Virginia.

The topography of the Southeast Drainage Basins is not uniform, differing widely in the different parts of the area. The basins lie in two of the major physiographic divisions of the United States, the Coastal Plain on the southeast and east and the Appalachian region on the northwest.

The basins are divided into forty-six sub-basins as established by the Water Pollution Control Agencies of these States. Twenty-two sub-basins are interstate. Their streams flow from one State to another or form State boundaries. In these sub-basins, pollution originating in one State may affect the water use in another State or other States. There are three interstate sub-basins common to the States of Virginia and North Carolina, three common to the States of North Carolina and South Carolina and the Savannah River forms the boundary between South Carolina and Georgia.

Georgia also has five sub-basins in common with Florida and three in common with Alabama. Alabama has four sub-basins in common with Florida and three others in common with Mississippi.

The Pearl River, which flows through Mississippi, also drains a part of Louisiana and forms a part of the eastern boundary of that State.

The estimated 1950 population for the Southeast Drainage Basins is 17,908,000 people, an increase of about 16 percent over the 1940 population. The increase has been greater in urban areas, 34 percent compared with a 6 percent increase in the rural population. There has been a 20 percent increase in urban communities (communities of over 2,500 people) since 1940, and there are now a total of 461 urban communities, 56 with populations of over 25,000 and 11 of these with population of over 100,000.

Water uses in the basins include industrial and domestic water supplies, power development, navigation, fish and wildlife propagation, recreation, final waste disposal and a limited amount of irrigation. There is adequate surface water in all parts of the basins to support considerable development. The very excellent chemical quality of the surface water and the development of hydro-electric power has attracted many industries to the area. The textile industry came because of the soft water. Ground water is limited in the Piedmont Plateau and is more highly mineralized than the surface water. In the Coastal Plains ground water is usually found in abundance and is used extensively for domestic and industrial water supplies.

There are 1,559 public water supplies. Three hundred and forty-eight are surface water supplies, 1,194 ground water supplies and 17 supplies using both surface and ground water. These water supplies provide approximately 1 billion gallons of water a day to 8,410,000 people of which approximately 5,000,000 depend entirely or partly on surface water as a source of supply.

There is no complete record of the quantity of water used for industrial purposes. Some industrial establishments depend on municipal water supplies; however, most of the industries that require large quantities of water maintain private water supplies. Industrial water needs in the basins exceed the domestic water supply requirements.

The Southeast Drainage Basins are rich in natural resources. Vast areas of good pine have attracted the pulp and paper industry. Cotton and good water supplies brought the textile industry, and the mineral resources of the area support various types of heavy industry. Almost every type of industry is found within the basins, but a large segement of the population is located in towns of 2,500 population or under. Industrial development is gradually shifting the population to urban communities.

The area is one of the nation's most popular playgrounds. The mild year around climate, natural beauty of the area, and the recreation afforded by the rivers, the lakes and the beaches, are attractive to the tourist. The business of caring for the vacationists is one of the leading business enterprises of the basins. There are almost unlimited potentialities for expanding recreational facilities providing the waters can be safeguarded against pollution.

There are 1,172 municipal and 1,112 industrial sources of pollution in the basins which discharge significant amounts of wastes to the watercourses. The reported organic pollution load discharged to the streams from 716 municipalities and 162 industrial plants for which data are available has a population equivalent of approximately 7 million people. In addition, there are 456 municipal sources of pollution serving over 3 million people and 208 industrial plants discharging organic wastes for which data on the amount of waste discharge to watercourses is not available. The industrial organic wastes originate principally from textile mills, paper and pulp mills, food processing, and chemical plants. The inorganic wastes produced by chemical plants, metal industries, the production of petroleum and coal, the manufacture of rubber products, and mining are also discharged to the watercourses.

Sixteen industrial plants produce both organic and inorganic wastes. The data on the type and quantity of wastes produced by 695 industrial establishments are incomplete. These plants are reported as producing wastes of undetermined type.

Stream pollution is a serious problem in some of the basins, such as in the more highly industrialized areas of the James, the Roanoke, the Yadkin, the Saluda, and the Broad in the Congaree Sub-Basin, the Warrior and the Neuse Rivers. Water supplies both domestic and industrial, and other water uses have been and are now affected. The available data are incomplete and will not permit a detailed accounting of all the damages due to pollution in these sub-basins. The data indicate, however, that comprehensive water pollution control programs are needed.

The progress made by the States in the Southeast Drainage Basins in water pollution control is reflected in the large number of existing municipal waste treatment plants. Most of these plants were constructed prior to World War II, through the efforts of the State agencies who promoted cooperative interest, advised on better treatment methods and when necessary issued abatement orders. During the war years, many construction projects for waste treatment plants were stopped or deferred because of restricted use of critical materials. To reactivate these programs it has been necessary for state water pollution control agencies to overcome the inertia which developed as a result of this period of relative inactivity in the pollution control program.

Good progress has been made in the construction of pollution abatement works during the postwar period. These were 99 municipal projects constructed during the years 1946 through 1949[1] to serve a population of 886,000. Construction during this period provided treatment facilities for nearly 14 percent of the population then known to need treatment of their wastes. Over one-half of these projects treating sewage from nearly 372,000 persons were built in 1949. Thirteen industrial waste treatment plants were constructed in the period 1947 through 1949. Seven of these plants were designed to treat wastes having a total population equivalent of 29,600. The amount of waste treated by the other six is undetermined.

A summary of the status of municipal pollution abatement in the area by sub-basins is given in the table that follows. The data contained in this table show that 66 percent of the 1,172 municipal sources of pollution serving over 3,380,000 persons--more than one-half of the total sewered population in the basins--are provided with some type of treatment for their sewage. This percentage, however, includes many centers of population having treatment that is considered to be inadequate. Thirty-four percent of the municipalities, with a population of 1,450,000, are known to have adequate treatment facilities or require no project. The sewage treatment needs of one-fourth of the sewered municipalities, with a combined population of approximately 1,300,000 are undetermined.

A summary of the municipal project requirements and project status is given by sub-basins in the following table. There are 654 known projects required to abate pollution contributed by 509 of the 1,172 sewered municipalities in the basins. Of these 654 required projects nine will serve population centers of over 100,000, 25 will serve population centers of over 25,000, 79 will serve centers with populations over 5,000, 89 will serve populations of from 2,500 to 5,000 persons, 212 from 1,000 to 2,500 persons, 141 from 500 to 1,000 persons and 99 will serve population centers of less than 500 people.

Twenty-eight or four percent of these 654 municipal projects, serving seven percent of the population requiring projects, were under construction as of July 1, 1950. Final plans have been approved for 20 additional projects and plans are in preparation for 88 more. Abatement of pollution has been ordered at 10 other municipal sources where projects are needed. No formal action has been taken by the remaining municipalities requiring projects.

A complete listing of project requirements by sub-basins, as reported by the States, is given in Tables I_1 through I_{45} in part II of this report. This listing is based on existing data which are incomplete in many instances. As additional information is obtained by further study and investigation some of the indicated needs may change.

Seventy-five or less than seven percent of the industrial plants having separate waste outlets are reported as providing some type of waste treatment facilities. Of these only 35 are

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[1] These construction figures in this paragraph cover only the period to January 1, 1950. It should be noted that there has been considerable progress in the construction of sewage treatment works since that date.

Status of municipal pollution abatement, Southeast Drainage Basins,* July 1, 1950

Sub-basins	Municipal sources of pollution**			
	Total number	Percent with treatment	Percent no project required	Percent of project requirements undetermined
Rappahannock River	13	70	46	0
York River	11	64	45	9
James River	91	53	40	1
Chowan River	26	77	58	0
Roanoke River	52	50	42	2
Tar River	19	79	32	5
Neuse River	39	72	77	3
North Carolina-Virginia Coast	18	61	22	39
Cape Fear River	43	74	65	0
Yadkin-Pee Dee River	47	79	51	6
Pee Dee River	49	75	63	0
Catawba-Wateree River	44	98	66	5
Congaree River	74	77	39	8
Santee-Cooper River	10	20	20	10
Edisto-Combahee River	17	94	71	0
Savannah River	55	67	20	38
Ogeechee River	11	64	--	(1)
Oconee River	16	44	--	(1)
Ocmulgee River	29	55	--	(1)
Altamaha River	9	100	--	(1)
Satilla River	8	37	--	(1)
St. Marys-Nassau River	3	67	67	0
St. Johns River	29	79	41	3
Suwannee River	20	80	5	65
Ochlockonee-St. Marks River	12	83	25	42
Withlacoochee River	5	80	0	0
Tampa Bay Area	29	59	10	3
Peace River	9	89	33	11
Kissimmee River	8	88	13	0
Florida East Coastal Area	13	77	15	15
Lower Florida Area	22	59	27	0
Flint River	29	59	0	(1)
Chattahoochee River	44	57	2	98
Apalachicola River	10	100	70	0
Choctawhatchee River	28	61	25	7
Perdido-Escambia River	24	58	33	25
Tallapoosa River	25	68	16	36
Coosa River	53	64	23	64
Cahaba River	8	63	25	0
Alabama River	11	36	18	45
Upper Tombigbee River	25	56	24	4
Warrior River	27	59	15	4
Lower Tombigbee River	9	45	0	11
Mobile Bay Area	6	83	50	0
Pascagoula River	25	68	56	0
Pearl River	17	82	47	0
Southeast Drainage Basins	1,172	66	34	24

*Detailed information can be obtained from State water pollution control agencies.

**Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse.

[1] The Georgia Water Pollution Control Agency has not furnished information.

Status of municipal pollution abatement, Southeast Drainage Basins,* July 1, 1950--Continued

Sub-basins	Total served by sewers	Population		
		Percent of sewered population		
		Served by treatment	Requiring no project	Project requirement undetermined
Rappahannock River	22,020	43	21	0
York River	6,050	13	8	2
James River	924,266	55	50	1-
Chowan River	32,592	45	29	0
Roanoke River	203,765	15	17	1-
Tar River	65,670	65	46	14
Neuse River	185,050	40	37	5
North Carolina-Virginia Coast	47,000	49	11	57
Cape Fear River	319,845	66	30	0
Yadkin-Pee Dee River	223,248	81	22	1
Pee Dee River	121,647	72	53	1
Catawba-Wateree River	230,945	79	20	1
Congaree River	361,390	69	31	3
Santee-Cooper River	105,750	4	4	[1] Population unknown
Edisto-Combahee River	37,315	88	76	0
Savannah River	288,430	34	7	65
Ogeechee River	9,750	71	--	(2)
Oconee River	41,090	16	--	(2)
Ocmulgee River	189,700	51	--	(2)
Altamaha River	11,860	100	--	(2)
Satilla River	37,700	16	--	(2)
St. Marys-Nassau River	1,450	50	50	0
St. Johns River	290,441	36	27	0
Suwannee River	49,275	71	8	67
Ochlockonee-St. Marks River	52,300	97	47	41
Withlacoochee River	5,350	62	0	0
Tampa Bay Area	337,345	57	1	1-
Peace River	39,000	90	60	1-
Kissimmee River	13,050	94	6	0
Florida East Coastal Area	55,410	60	4	38
Lower Florida Area	258,940	40	18	0
Flint River	83,825	46	0	--
Chattahoochee River	401,815	69	1-	98
Apalachicola River	22,100	100	73	0
Choctawhatchee River	68,455	55	17	6
Perdido-Escambia River	101,660	80	25	4
Tallapoosa River	69,920	55	8	22
Coosa River	183,835	40	19	54
Cahaba River	25,300	89	13	0
Alabama River	122,275	2	1	49
Upper Tombigbee River	69,875	26	39	2
Warrior River	386,725	50	3	1-
Lower Tombigbee River	9,310	21	0	18
Mobile Bay Area	129,800	25	15	0
Pascagoula River	188,700	33	24	0
Pearl River	159,500	18	14	0
Southeast Drainage Basins	6,590,739	51	22	20

*Detailed information can be obtained from State water pollution control agencies.
[1] U.S. military installations for which population data are not available.
[2] The Georgia Water Pollution Control Agency has not furnished information.

Municipal** project requirements and project status, Southeast Drainage Basins,* July 1, 1950

Sub-basins	Project requirements		
	Number of projects required	Population to be served by required projects	Percent of sewered population represented in requirements
Rappahannock River	7	17,330	79
York River	5	5,420	90
James River	58	458,665	50
Chowan River	15	23,247	72
Roanoke River	31	168,074	83
Tar River	20	26,350	40
Neuse River	9	107,800	58
North Carolina-Virginia Coast	9	14,920	32
Cape Fear River	24	222,690	70
Yadkin-Pee Dee River	25	171,748	77
Pee Dee River	23	57,290	47
Catawba-Wateree River	35	181,040	78
Congaree River	62	237,895	66
Santee-Cooper River	13	101,950	96
Edisto-Combahee River	6	9,075	24
Savannah River	[1] 36	81,630	28
Ogeechee River	(1)	--	--
Oconee River	(1)	--	--
Ocmulgee River	(1)	--	--
Altamaha River	(1)	--	--
Satilla River	(1)	--	--
St. Marys-Nassau River	[1] 3	1,985	52
St. Johns River	16	210,951	73
Suwannee River	[1] 11	15,391	25
Ochlockonee-St. Marks River	[1] 6	8,219	13
Withlacoochee River	5	5,350	100
Tampa Bay Area	25	332,095	99
Peace River	5	15,450	40
Kissimmee River	7	12,300	94
Florida East Coastal Area	9	32,260	58
Lower Florida Area	17	212,570	82
Flint River	(1)	--	--
Chattahoochee River	[1] 7	8,500	26
Apalachicola River	4	7,040	27
Choctawhatchee River	21	54,140	79
Perdido-Escambia River	18	71,450	70
Tallapoosa River	[1] 17	49,000	70
Coosa River	[1] 12	47,950	26
Cahaba River	8	22,000	87
Alabama River	6	60,950	50
Upper Tombigbee River	20	40,975	59
Warrior River	24	376,025	97
Lower Tombigbee River	9	7,610	82
Mobile Bay Area	5	110,400	85
Pascagoula River	12	144,200	77
Pearl River	9	137,800	86
Southeast Drainage Basins	654	3,869,735	59

*Detailed information can be obtained from State water pollution control agencies.

**Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse.

[1] Does not include data for the State of Georgia. The Georgia Water Pollution Control Agency has not furnished information.

Municipal** project requirements and project status, Southeast Drainage Basins,* July 1, 1950

Sub-basins	Project status					
					Projects under construction	
	Undetermined or no formal action	Abatement ordered	Plans in preparation	Final plans approved	Percent of total required	Percent of sewered population to be served
Rappahannock River	7	0	0	0	0	--
York River	4	0	1	1	0	--
James River	36	0	16	4	5	2
Chowan River	14	0	0	1	0	--
Roanoke River	24	0	8	0	0	--
Tar River	19	1	1	0	0	--
Neuse River	7	3	0	0	0	--
North Carolina-Virginia Coast	15	0	0	0	0	--
Cape Fear River	21	0	0	2	4	1
Yadkin-Pee Dee River	24	0	0	2	0	--
Pee Dee River	16	2	3	1	4	14
Catawba-Wateree River	29	0	5	1	6	44
Congaree River	50	3	10	0	8	3
Santee-Cooper River	12	0	2	0	0	--
Edisto-Combahee River	4	0	2	0	0	--
Savannah River	43	0	10	0	11	4
Ogeechee River	--	--	--	--	--	--
Oconee River	--	--	--	--	--	--
Ocmulgee River	--	--	--	--	--	--
Altamaha River	--	--	--	--	--	--
Satilla River	--	--	--	--	--	--
St. Marys-Nassau River	2	0	0	1	0	--
St. Johns River	14	0	3	0	0	--
Suwannee River	21	1	1	0	9	26
Ochlockonee-St.Marks River	10	0	1	0	0	--
Withlacoochee River	3	0	0	1	0	--
Tampa Bay Area	21	0	1	0	16	40
Peace River	4	0	1	0	20	35
Kissimmee River	4	0	2	1	0	--
Florida East Coastal Area	6	0	2	2	11	Population unknown
Lower Florida Area	8	0	6	0	0	--
Flint River	--	--	--	--	--	--
Chattahoochee River	50	0	0	0	0	--
Apalachicola River	4	0	0	0	0	--
Choctawhatchee River	18	0	3	0	0	--
Perdido-Escambia River	23	0	1	0	0	--
Tallapoosa River	25	0	1	0	0	--
Coosa River	45	0	1	0	0	--
Cahaba River	7	0	1	0	0	--
Alabama River	11	0	0	0	0	--
Upper Tombigbee River	16	0	3	1	0	--
Warrior River	21	0	3	0	4	1
Lower Tombigee River	10	0	0	0	0	--
Mobile Bay Area	2	0	0	0	60	5
Pascagoula River	11	0	0	1	0	--
Pearl River	7	0	0	1	11	6
Southeast Drainage Basins	[1]780	10	88	20	4	7

*Detailed information can be obtained from State water pollution control agencies.

**Includes incorporated or unincorporated municipalities; other legal bodies as, sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers; sanitary sewage wastes discharged by industry directly to watercourse.

[1] Includes 112 projects in Georgia for which no data have been supplied regarding project status.

known to have adequate capacity. The lack of information regarding the industrial sources of pollution is evidenced by the fact that of the industrial waste treatment plants reported, the adequacy with relation to capacity and operation of nearly 40 percent of the facilities is undetermined. Furthermore, data are not available in regard to the treatment facilities of 781 industrial plants.

Water pollution control legislation in the nine States varies from recently enacted comprehensive legislation[2] to scattered statutory provisions dividing the authority among State agencies. Alabama, Louisiana, South Carolina, Tennessee and Virginia have legislation establishing water pollution control authorities and are developing satisfactory programs. Florida has statutory authority to establish rules and regulations and has an active water pollution control program. Georgia has general statutes protecting the health of the people and the rights of riparian owners against pollution. In Mississippi the water pollution control authority is divided between the State Board of Health and the Game and Fish Commission.

Uniform State legislation is desirable for more effective pollution abatement in several of the sub-basins, and for the establishment of interstate compacts. There are no interstate compacts between the States of the Southeast Drainage Basins, but less formal existing inter-state agreements between administrative agencies in some of these states are effective in bringing about pollution control. Where inter-state compacts are desirable and would facilitate the development of comprehensive programs they should be formed.

A program of public education is needed in many of the sub-basins to present the advantages of, and the necessity for pollution abatement.

On the basis of available data, which are admittedly incomplete, the initial construction cost of new municipal waste treatment plants and enlargement or replacement of existing plants, where requirements are now known, is estimated to be $108,000,000. This estimate does not include funds needed for the construction of waste treatment facilities for municipal sources of pollution for which the requirements are undetermined or unreported nor any money for the construction of industrial waste treatment works, required for the abatement of industrial pollution.

The lack of data as to the amounts of pollution discharged to the watercourses from 456 municipal sources of pollution and as to the types and amounts of industrial wastes discharged from the 950 industrial plants makes it difficult to estimate the construction cost of all treatment works required to abate the existing pollution resulting from municipal and industrial waste discharges. However, on the basis of sewered population, treatment for the 456 municipal sources of pollution is estimated to cost $100,000,000.

The amount of industrial organic pollution discharged to watercourses has been reported for only 162 of the 370 industrial establishments producing organic wastes. The wastes from these 162 plants are reported to have a population equivalent of over 3.5 million. Based on the reported population equivalent of the organic wastes, the cost of constructing treatment plants for these wastes is estimated to exceed $150,000,000. The construction of waste treatment works needed to abate the pollution resulting from the discharge of organic and inorganic industrial waste from the remaining 950 industrial plants would probably cost in excess of $140,000,000. Considering all the municipal and industrial sources listed by the State water pollution control agencies, the approximate construction cost of needed remedial work is estimated at $500,000,000.

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[2] The 1951 general assembly of North Carolina enacted a new water pollution control act.

CONCLUSIONS

From a review of the data furnished by the State water pollution control agencies and other available information, it is concluded that:

1. The area is rich in natural resources including fertile lands, large forests, wildlife, mineral wealth, and an abundance of water. The water resources of the Basins are used primarily for public and industrial water supplies, agriculture, recreation, wildlife, power, navigation, sport and commercial fishing.

2. The waters of the Basins are not currently used to their utmost. There is an adequate quantity of water to sustain extensive additional industrial expansion, population growth and other legitimate uses provided all water uses are considered in the development of comprehensive water pollution control programs for each of the sub-basins.

3. Projects for the development of hydroelectric power, navigation, flood control and irrigation now under construction or authorized for construction will bring about extensive industrial development and corresponding increases in population.

4. The rivers in some of the highly industrialized and/or populated areas of the Basins are polluted to a degree that existing water supplies are endangered and the development of additional needed water supplies is handicapped or prevented. In addition, these polluted waters are not suitable to be used for livestock water supply, wildlife, fishing and most recreational purposes.

5. Losses and damages now experienced because of impairment of water quality by pollution will increase with growth of urban areas and expansion of industrial activity if pollution control does not keep pace with urban and industrial development.

6. In many sub-basins, past and present mismanagement of land, favoring soil erosion, has resulted in excessive silt in watercourses. This pollution not only has resulted in a loss of a valuable natural top soil resource, but has impaired the ability of streams to recover from organic pollution. It has also destroyed aquatic life, hindered navigation, in some instances increased cost of water treatment and prevented most recreational uses.

7. Only basin-wide comprehensive water pollution control action programs can preclude economic losses and damages to watercourses and guarantee more complete utilization of the water resources. It is therefore essential that all interested local, State, and Federal agencies exchange information and coordinate their efforts, not only to abate existing pollution but to prevent pollution that may otherwise arise directly or indirectly from the development of water resources projects.

8. Although twenty-two of the forty-six drainage sub-basins in the area are of an interstate character, no interstate compacts for pollution abatement and/or control exist between the States. However, less formal interstate agreements have proven effective.

9. Diverse State legislation for control of water pollution exists in the area. Some of the States need specific legislation that enables them to develop comprehensive water pollution control programs on a basin-wide basis. Others need greater authority to restore and protect the watercourses. State legislation uniform in principle together with continued interstate cooperation will be helpful in the development of basin-wide comprehensive action programs.

10. In States where work on municipal sewage treatment facilities may be delayed and in some cases deferred by financing difficulties due to debt limitations and/or lack of public support, this major obstacle should be removed.

11. Insufficient State personnel, equipment, and/or funds are retarding the development of sound water pollution control activities in some of the sub-basins. Salary restrictions in some States are preventing the employment of additional qualified professional personnel.

12. Municipal and industrial pollution data are incomplete. Industrial wastes data are especially fragmentary, and additional field information is required. The States have sufficient data on certain municipal and industrial waste discharges in some areas to allow initial action toward abatement.

13. Unsatisfactory operation and/or lack of maintenance has reduced the efficiency of 23 percent of the existing sewage treatment plants as reported in table E. The capacity of 40 percent of these municipal treatment facilities is reported as unsatisfactory.

14. The construction of presently planned municipal treatment works will serve nearly 1.6 million people, over 24 percent of the entire sewered population of the Southeast Drainage Basins. Completion of these projects will reduce by 34 percent the present sewered population not now served by treatment works.

15. Additional field studies are necessary to determine sources and amounts of pollution, all types of water use, the effect of industrial and domestic wastes on the streams, and stream flows for the establishment of water

quality objectives for maximum utilization of the water resources. The degree of treatment required for each source of pollution should be determined, based on these data.

16. The public has become interested in water pollution control but there remains a need for a broad program of information and education in some areas to apprise the public and industry of the objectives of the State water pollution control agencies and the benefits of, and the necessity for, basin-wide water pollution control programs.

RECOMMENDATIONS

It is recommended that:

1. Comprehensive investigations be made where needed by the State water pollution control agencies to determine all water uses, all sources of pollution, stream conditions and the status of waste treatment to fill the existing gaps in information on pollution sources and stream conditions. State water pollution control agencies should continue to assume the leadership and responsibility of obtaining information and the cooperation of the other State agencies and local groups interested in water use or water pollution control. All available information at municipal, State or Federal level should be compiled in comprehensive reports which can be used by the States.

2. Present informal agreements between States with regard to water pollution control of interstate streams be strengthened and uniform policies for the investigation, abatement and prevention of interstate pollution be further developed.

3. Where needed, each State enact workable uniform water pollution control legislation to facilitate the development of comprehensive programs for inter- and intrastate streams.

4. State sponsored public information programs, apprising the people of the basins of the importance of comprehensive water pollution control, should be expanded and strengthened, so as to increase public support for conservation of the water resources.

5. Municipalities, institutions and industrial plants recognize their responsibilities and proceed with the planning and constructing of needed water pollution abatement projects. Positive action should be taken by the State water pollution agencies to abate pollution in accordance with their policies. Where ample notice has been given and evasion of responsibility is apparent the State regulatory agencies should vigorously apply their enforcement powers.

6. Research programs be developed cooperatively by industry, industrial groups, and State and Federal agencies to develop or improve waste treatment methods; and that industry explore the possibility of reducing its wastes by improved housekeeping and/or reclamation of valuable materials.

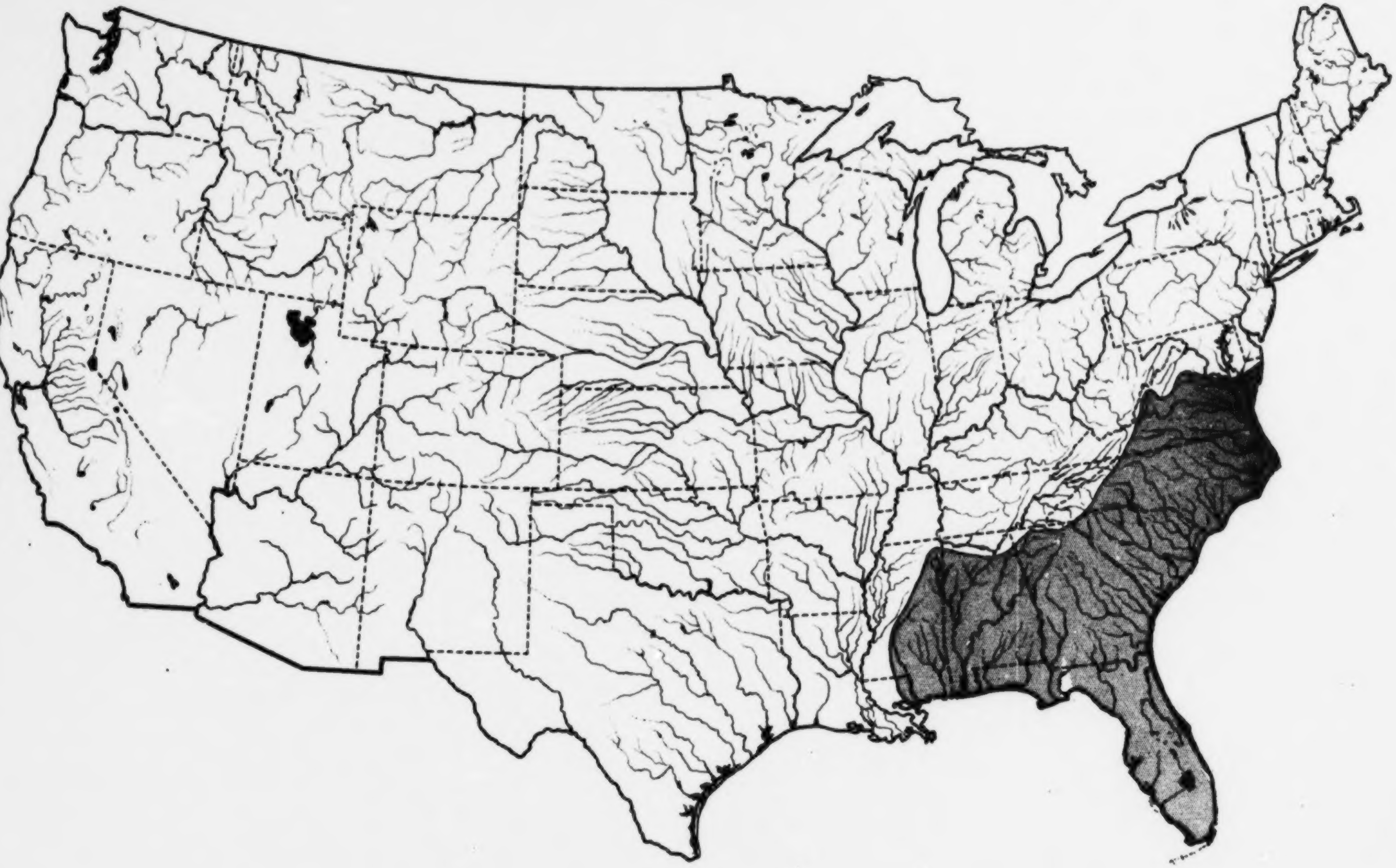
7. Funds for the maintenance and operation of all existing and future waste treatment facilities be provided by those responsible for the operation of these works.

8. State governments within the basins energetically support the State water pollution control program through provision of adequate funds, staffs, and equipment. Where regulations or salary limitations are a deterrent to adequate staffing of the State water pollution control agencies, suitable legislation or regulations to remove these obstacles should be provided.

9. Federal and State support of land management improvement programs to reduce the silt load now reaching the streams be accelerated.

LOCATION MAP

Southeast Drainage Basins



XVII

GENERAL DESCRIPTION

Historical Background

The great river estuaries of the Southeast Drainage Basins were first explored by the Spanish in the early 16th Century. Their subsequent colonization and development culminated in the control of the Florida peninsula for three centuries. Spanish expansion northward was to a relatively minor extent, since they were engaged in the Mexican and South American conquests.

The Spaniards were active along the Gulf Coast, and many of their expeditions in search of gold originated from this coastal area. They did not use the rivers--the natural highways--but forced their way across country on horseback living off the land.

The first permanent English settlement in America (1607) was founded near the mouth of the James River in Virginia. From there the settlers expanded farther to the south and, in 1680, founded Charleston at the confluence of the Cooper and Ashley Rivers. Still later (1733) Savannah was established at the mouth of the Savannah River.

The French entered the area about the beginning of the 18th Century. They used the numerous navigable streams to carry on a successful trading business with the powerful Indian tribes of the region. All of the rivers were navigable by small boats to the fall line and served as the principal means of transportation until the construction of railroads.

Early in the 19th Century the Federal government extended the public land system to the region. Settlers were dependent upon the rivers for transportation and access to these lands, but the use of the waterways was limited while the mouths of the rivers were under Spanish control.

There was limited industrial development in the area before the Civil War. However, cotton and tobacco were the backbone of the economy. Substantial development began when the South changed to a combined agricultural and industrial economy.

The future is promising. Natural resources of the area, especially the abundance of water of good quality, assure industrial expansion if the watercourses are protected against misuse.

Physical Description

The Southeast Drainage Basins lie, roughly, between the 75th and 90th meridians west, and between the 25th and 39th parallels north. The area with an average width of approximately 250 miles extends bandlike along the Gulf and Atlantic Coasts for a distance of roughly 950 miles. The peninsula of Florida projects southward from the middle of this band for about 400 miles. The major part or all of the States of Virginia, North and South Carolina, Georgia, Florida, Alabama, and Mississippi are included in the area. The basins encompass approximately 282,652 square miles, or nearly one-tenth of the area of continental United States. Natural boundaries are formed by the Atlantic Ocean on the east, the Gulf of Mexico on the south, the Mississippi River drainage on the west, the Tennessee River drainage and the Appalachian mountain range on the northwest, and the Potomac River drainage on the north.

The topography of the continental portion of the Southeast Drainage Basins is not uniform, but differs widely in the different parts of the area. The basins lie in two of the major physiographic divisions of the United States, the Coastal Plain on the southeast and east and the Appalachian region on the northwest.

The Coastal Plain is a single great province which borders the coast from southern New England into Mexico. It is generally characterized by flatness and rather light sandy soils. The Florida Peninsula section of the Coastal Plain is due to the partial emergence of an extensive flat-topped plateau which rises abruptly from the deep sea floor. This latter area is distinguished by many limestone sinks and shallow lakes. Streams of the Coastal Plain are sluggish, and are generally bordered with extensive well-timbered swampy areas which serve as natural reservoirs to retain the flood pools.

The Appalachian region, on the other hand, includes parts of four provinces. All of which extend far beyond the boundaries of the area. These provinces are the Piedmont upland, the Appalachian Mountains, the Appalachian Valley and Ranges and the Appalachian Plateau.

The Piedmont upland extends from Hudson River to central Alabama. It reaches an extreme altitude of 1,800 feet in the Southeast Drainage Basins.

Piedmont streams are characterized by occasional rapids with long intervening pools and favorable sites for storage dams. Underground waters are not abundant, springs are usually relatively weak, and dry-season flow of small tributaries is relatively low. Much of the land shows the effects of serious erosion under the plow, although the slopes are moderate. The Piedmont is separated from the Coastal Plain in most areas by a well defined fall line.

The Appalachian Mountains extend across southwestern Virginia, North and South Carolina and into the northeastern part of Georgia reaching an altitude of about 3,000 to 5,000 feet.

The Appalachian Valley and Ranges also extend from New York State to central Alabama, crossing the northwestern part of Georgia.

The Appalachian Plateau, another province that extends from New York State to Alabama includes a portion of the Southeast Drainage Basins in the northern part of Alabama.

The basins area is characterized by many relatively short streams which are of two general types, i. e., the longer streams arising in the Appalachian Mountains and flowing through the Piedmont upland where they pick up heavy loads of silt, and the shorter, relatively clear streams arising in the Coastal Plain. Many of these rivers are navigable to the fall line which extends from 100 to 200 miles back from the coast.

Climate-Hydrology

The Southeast Drainage Basins have a humid or forest type climate, with average annual rainfall varying from 35 inches in the Appalchian Mountains of Virginia to 80 inches in the mountains of northern Georgia and South Carolina. Average annual rainfall by States varies from 42.63 inches in Virginia to 53 inches in Alabama with an over-all average for the entire area of 49.84 inches. Rainfall is generally heavier along the coast and decreases inland. An exception is found, however, in the mountains at the junction of Georgia, Tennessee, North Carolina and South Carolina where rainfall gradients build up rapidly from 50 inches to 80 inches.

Stream flows and runoff are extremely variable not only as to season, but also as to locality. There is a great variation between the average annual flow and the minimum flow. Runoff varies from 273 second feet per square mile in the mountainous area to less than .4 second feet per square mile in the coastal areas. Most of the runoff occurs from December to May with a secondary peak in July and August. The lowest flows usually occur in the fall with a secondary shortage of flow in June. The construction of reservoirs has provided a great degree of artificial regulation below the dam sites.

Economic Development

The basins are rich in natural resources, the greatest of which are the soils and water. Although all of the soil is not as rich as some soils of other parts of the nation, the rainfall and temperature of the region permit the production of a variety of specific crops of high economic value. From the beginning of active colonization along the Atlantic and Gulf Coasts, the economy of the region depended on the cultivation of staple crops. Rice and tobacco were the first money crops in the uplands with considerable commerce in naval stores along the coast. There are many rivers and streams which rapidly are being harnessed for the production of hydroelectric power. These waterways are playing an increasingly important role in the economic development of the region.

The Industrial Revolution, which transformed the textile industry of England and the invention of the cotton gin by Eli Whitney in Georgia, changed the agriculture of the area from South Carolina westward through Louisiana and cotton became the economy of the region. Men of the upland country abandoned the production of food stuffs and their small beginnings in manufacture and turned to growing the new staple. Cotton production increased and bales were taken down the most convenient river to the markets of Charleston, Savannah and Mobile. In North Carolina and Virginia new methods of curing and the introduction of superior varieties of tobacco increased the production about 115 percent in ten years and tobacco remained important in the economy of these States.

The War Between the States inevitably disrupted the economic and social life of the South. The most important economic institution--slavery, which represented the largest single investment of southern wealth, was destroyed. Only the land and the unbroken spirit of the people remained to begin the "New South".

Following the Reconstruction Period, the South began a great diversification of agriculture. Cotton and tobacco continued as major crops, but agricultural interest in truck farming and fruit growing increased. Improved rail connections and refrigeration made possible the shipment of produce to all parts of the nation. In more recent years livestock production of both beef cattle and dairy herds has increased. Year-round green pastures economically support large herds and the development of such pastures is returning to use fields damaged by erosion. Swamp lands have been drained and converted to citrus groves and truck farms, adding to the agricultural wealth.

Florida has undergone rapid expansion in population since 1880. In the early 1920's a "land boom" occurred which resulted in a gain in population of over thirty percent in five years. This trend continued at a comparable pace in the succeeding two decades, resulting in a mid-century population that was more than double that of 1920. Florida became more than fifty percent urban, in 1930 the first of the southern States to become so.

Outsiders, fascinated by the climate and beauty of the State built hotels and resorts as the railroads were extended, thus creating the nation's winter playground.

Considerable income in many local areas is derived from winter vacationists, hunters, fishermen and those seeking general recreation.

The south, so rich in natural resources, would be expected to develop diverse industries. After the War Between the States industrial development began anew. New factories appeared in towns and cities; mining and the railroads grew; and cities developed. Atlanta proclaimed itself the "New York of the South" and became the rail center of the region.

The resources of iron, coal and water power have been major factors in attracting heavy industry. The city of Birmingham, incorporated in 1871, is a product of the southern industrial era. Developed near a source of iron ore and coal, it soon became the iron and steel center of the region and is frequently referred to as "the Pittsburgh of the South".

The textile industry attracted by unpolluted soft water and water power became particularly prominent, appearing in small and large communities throughout the region. By 1920 southern mills were turning out more than half of the total cotton goods in the country, and by 1927, sixty percent of the nation's cotton mill workers lived in the south.

Development of hydro-electric power has been an important factor influencing the economic development and industrial growth of the area. Seventy-five existing plants and five plants under construction will have a total generating capacity of 2,536,163 kilowatts, less than 30 percent of the potential power of the area.

less than 30 percent of the potential power of the area.

Other important industries in the region consist of processing of food products, manufacture of paper and allied products, chemicals, rubber products and those associated with petroleum and coal. The commercial fishery industry of the Atlantic and Gulf Coasts is of economic importance in these coastal areas.

Along with a growing industrial economy has been a gradual shifting of populations to urban communities. This process is still continuing, but the population is still predominantly rural. The population of the Southeast Drainage Basins is about 17,900,000, according to preliminary 1950 U. S. census reports. Of this total population, about 7,100,000 or forty percent live in communities having urban classification. Urban population increased thirty-four percent during the past decade, while the rural population increased only six percent. There are 461 urban communities in the basins, of which fifty-six each have a population of more than 25,000, and eleven each have a population in excess of 100,000.

In regard to future development, it may be expected that industrialization will continue.

The problem of water pollution control is closely related to the general economic development of the area encompassed by the Southeast Drainage Basins. Soil erosion is one of the major problems. Other types of pollution become acute problems as urban populations increase and industry expands. Demands for water of high quality may be expected to become greater.

USES OF WATER RESOURCES

The water resources of the basins are used for domestic, industrial and livestock water supplies, hydroelectric power, fish and wildlife propagation, commercial fishing, navigation, recreation, limited irrigation, and the ultimate disposal of wastes. The economy of the basins has always been predominantly agricultural. Industry, of little consequence during the early development of the region, has become an important economic factor but in most of the area the agricultural population still dominates. The abundance of water especially suited for industrial water supplies has attracted a number of manufacturers to the area. A combined agricultural and industrial expansion and development in the area will continue because of the abundance of available water.

There are 1,559 public water supplies in the basins serving a population of approximately 8,410,000 or about 48 percent of the total population. Nearly a fourth of these supplies (365) obtain all or part of their water from surface sources. The population served by the surface supplies exceeds 4,960,000, 59 percent of the total population served by public water supply systems. Surface water is abundant in practically all areas of the basins. In the Piedmont Plateau all of the large water supplies depend on surface water sources as ground water is limited and more highly mineralized. In the coastal plains, both surface and ground water are usually found in abundance. The cities of Jacksonville, Miami, and Pensacola in Florida and Montgomery, Ala. depend entirely on well water supplies. The encroachment of salt water is a problem at Miami during dry periods. Savannah, Ga. uses both surface and ground water. The coastal cities of Norfolk, Va.; Wilmington, N.C.; Charleston, S.C.; Tampa, Fla. and Mobile, Ala., obtain all of their water from surface sources. The surface waters of the basins must be depended upon to furnish most of the future water supply needs. It is therefore important that the quality of the water be safeguarded by abating existing pollution and preventing new sources of pollution.

In addition to the water supplied for domestic purposes many of the public water supplies provide water for industrial uses. Numerous industrial establishments, however, maintain private water supplies. There is no complete record of the quantity of water used for all industrial purposes, but undoubtedly industrial water demands in the basins far exceed the domestic uses. While much of the water used by industry is for cooling and other purposes where the quality is not too important, the large quantities of water required in chemical, textile, and paper manufacturing processes must meet extremely high water quality standards. In some instances the industrial water quality requirements are more rigid than the domestic requirements.

Pollution already has affected seriously the surface water in the more highly industrialized areas where the demands placed upon the watercourse for domestic and industrial water supplies and for the disposal of the wastes exceed the natural ability of the stream to purify itself. Existing water supplies on the Dan River in the Roanoke Sub-Basin and on the Neuse and Catawba-Wateree Rivers are affected. The development of additional water supplies for the cities in the Roanoke and Neuse River Sub-Basin is being retarded because of existing pollution. In the Congaree, Santee-Cooper, St. Marys, Coosa and Warrior Rivers and in other sub-basins industrial and domestic pollution is limiting water uses in certain reaches of these watercourses. The necessity is apparent for maintaining waters of suitable quality for--public and industrial water supplies one of the primary uses of water. The degree of treatment of municipal and industrial wastes required to prevent damaging pollution of the streams must be determined and provided.

The existing and potential hydroelectric power projects with generating capacities greater than 2,500 kilowatts as of July 1, 1950, are shown in the accompanying table. The topography of thirty-four of the sub-basins is well suited for the development of hydroelectric power at one or more sites. In nineteen of the sub-basins, power projects are in operation. There are seventy-five existing developments having a combined installed generating capacity of over 1,943,000 kilowatts. Most of these are privately owned.

Five additional projects are under construction which will have a total generating capacity of 593,000 kilowatts. The total installed capacity of these eighty power projects will be about one-third of the developed hydroelectric power east of the Mississippi River. The undeveloped hydroelectric project sites in the basins have an estimated potential power of 6,021,000 kilowatts. The estimate of potential installed capacity has been in some instances based on complete field data and exhaustive study, while in other instances the estimates were made on investigations in the nature of reconnaissance surveys. Additional investigations are needed to determine if all

Existing and potential hydroelectric power projects* with generating capacities greater than 2,500 kilowatts, Southeast Drainage Basins, July 1, 1950

Sub-basins	Hydroelectric projects				
	Existing		Under construction		Potential
	Number	Installed capacity (kilowatts)	Number	Installed capacity (kilowatts)	Installed capacity[1] (kilowatts)
Rappahannock River.........	1	3,150	--	--	101,000
York River.................	--	--	--	--	15,000
James River................	5	38,115	--	--	325,000
Roanoke River..............	5	27,830	2	218,000	350,000
Tar River..................	--	--	--	--	54,000
Neuse River................	--	--	--	--	
Cape Fear River............	1	2,900	--	--	172,000
Yadkin-Pee Dee River.......	5	221,100	--	--	320,000
Pee Dee River..............	--	--	--	--	
Catawba-Wateree River......	12	444,220	--	--	509,000
Congaree River.............	15	241,770	--	--	
Santee-Cooper River........	1	132,615	--	--	
Edisto-Combahee River......	--	--	--	--	15,000
Savannah River.............	9	193,690	1	280,000	810,000
Oconee River...............	1	2,800	1	45,000	338,000
Ocmulgee River.............	2	18,050	--	--	
Altamaha River.............	--	--	--	--	
Satilla River..............	--	--	--	--	187,000
St. Marys-Nassau River.....	--	--	--	--	
Ochlockonee-St. Marks River	1	8,800	--	--	--
Withlacoochee River........	1	3,213	--	--	--
Flint River................	2	16,600	--	--	840,000
Chattahoochee River........	6	92,810	--	20,000	
Apalachicola River.........	--	--	1	30,000	
Perdido-Escambia River.....	1	5,200	--	--	--
Tallapoosa River...........	3	181,000	--	--	944,000
Coosa River................	4	309,300	--	--	
Cahaba River...............	--	--	--	--	
Alabama River..............	--	--	--	--	
Upper Tombigbee River[2].....	--	--	--	--	916,000
Warrior River..............	--	--	--	--	
Lower Tombigbee River......	--	--	--	--	
Pascagoula River...........	--	--	--	--	41,000
Pearl River................	--	--	--	--	84,000
Total....................	75	1,943,163	5	593,000	6,021,000

*Data furnished by the Federal Power Commission.

[1] Several of the potential developments involve the submergence or redevelopment of existing plants. The capacity of these future plants is shown as the net increase in supply.

[2] This plan of development includes flows diverted from the Tennessee River.

the feasible potential power which could be developed in any sub-basin is shown in the table, or if all the power shown would be economically feasible of development.

Many areas in the basins are of importance for recreational purposes. The southern Atlantic Coast, Florida, and the Gulf Coast are the winter playgrounds for a large part of the nation. The waters of these areas, both fresh and salt, with their excellent beaches, abundant game fish and migratory waterfowl populations, and the warm winter climate are major factors attracting recreation seekers. The coastal areas of Virginia, the Carolinas, Florida and Mississippi similarly serve as summer playgrounds.

The interior areas also are used extensively for recreation, but primarily by the local inhabitants. The waters there are increasingly being used for bathing, boating, hunting and sport fishing. The importance of the use of these waters for recreation is demonstrated by provision for this activity on multiple-purpose reservoirs, and by the construction of small impoundments for recreation.

Commercial and game fishing along the coastal areas of the region and in some of the rivers are important uses of the water resources. Oysters, shrimp, and crabs, marine shore fishes and the anadromous species such as shad and herring occupy a high position in the economy of the coastal areas. Pollution in many river estuaries has resulted in the closing of large oyster producing areas. It has been estimated that the abatement of pollution in the Pensacola Bay would permit the opening of closed areas which would increase shellfish yield approximately $2,000,000 per year.[3]

Pollution control activities in some localities has enabled a few shellfish producing areas to be reopened. The entire northern section and other portions of the oyster grounds in Hampton Roads, Va., were closed in 1926 because of sewage pollution from Norfolk, Portsmouth, Newport News, Hampton, Phoebus and Old Point Comfort, all on the bay. The Hampton Roads Sanitation Commission's persistence since 1938 has brought about the construction of four sewage treatment plants. The resulting improvement in water quality permitted the opening of 1,500 acres of the condemned area to shell-fishing. Spawning runs of anadromous fishes have been reduced in some Atlantic Coast rivers because of pollution. This is especially true of the Roanoke River.

Navigation is well developed and plays an important part in the economy of the basins. The Atlantic section of the Intracoastal Waterway connects the principal harbors along the Atlantic Coast providing a protected passage from New Jersey to Miami, Fla. The Gulf Section of the Intracoastal Waterway extends from the St. Marks River in Florida to Brownsville, Tex.

There is also an intracoastal waterway along the west coast of Florida from Fort Myers to Tarpon Springs. It is planned to continue this intracoastal waterway to connect with the Gulf Section of the Intracoastal Waterway at St. Marks River and develop a barge canal across Florida connecting the Atlantic Section with the Gulf Section. Many of the rivers are navigable to the fall line. The Tombigbee-Warrior River System is navigable to Birmingport. The deepening of the channel of the Alabama River to provide better navigation to Montgomery is being planned. A project on the Savannah River will provide navigation as far as Augusta, Ga. The St. Johns River which played an important part in the opening of Florida is one of the most important of the navigable streams. The lower part of the River will be a part of the connecting canal between the Atlantic and Gulf Section of the Intracoastal Waterways.

A large portion of the overwintering area of our migratory waterfowl is located within the basins. The sounds and bays of the North Carolina and Virginia coasts, and numerous fresh water lakes and marshes of Florida, and the river estuaries of the Gulf Coast provide the necessary food and cover for these species. The densely forested swamps found along many of the rivers of the Coastal Plain provide sanctuary for large populations of white-tailed deer, racoons, opossums, gray squirrels and the remnants of once numerous flocks of wild turkey. This game provides excellent hunting in many areas.

With the change from crop farming to livestock production and dairying in large areas of Mississippi, Alabama, Georgia and Florida, the use of the surface water resources is of growing importance to agriculture. Also truck farmers in the States of the basins are using irrigation to substantially increase their crop production. In 1939 over 128,000 acres were being irrigated, most of which were in Florida. The long growing season combined with irrigation of the land has produced a greater yield and further use of water resources for this purpose is anticipated.

The primary water uses of the basins are indicated on map no. 4. The ultimate disposal of wastes to the watercourses, although an important water use, has not been shown; however, it is recognized that the treated or untreated water carrying domestic and industrial wastes must be discharged to a watercourse. The capacity of a stream to assimilate such wastes is limited and when exceeded it is no longer able to meet the needs of other water uses. Such pollution prevents maximum utilization of the waters of the stream.

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[3] "Florida Health Notes" published by Florida State Board of Health, October 1947.

POLLUTION CONTRIBUTED TO WATER RESOURCES

The Southeast Drainage Basins have been divided into 46 sub-basins. The number of sources of municipal and industrial pollution by sub-basins is shown in map no. 1 "Sources of Pollution". In part II of this report the detailed statistical data concerning sources of pollution in each of the forty-six sub-basins are presented in tables A_1 to A_{46} and B_1 to B_{46}. The data contained in this part of the report is a summation of the sub-basins and relates to the Southeast Drainage Basins as a whole.

The amount of pollution discharged to watercourses from municipal sewage systems is indicated in table A. There are 1, 172 centers of population discharging sewage to the watercourses. The population served by these sewerage systems is more than 6. 5 million. Seven hundred and sixteen of these municipal systems which serve approximately 3. 5 million persons discharge wastes with an estimated population equivalent of 3. 3 million to the watercourses. Four hundred and twenty-eight, with an estimated population served of over 3 million, discharge wastes of undetermined strength. Another 29 centers of population, for which no population served figures are available, discharge wastes to the watercourses of the area. Data regarding the quantity and strength of wastes contributed by industries to municipal sewers is incomplete.

Table B indicates there are 1, 112 industries discharging wastes to the watercourses through separate outlets. One hundred and sixty-two of these contribute organic wastes having a reported population equivalent of over 3. 5 million. There are an additional 208 industries discharging organic wastes through separate outlets for which the amount of pollution contributed is as yet undetermined. The organic industrial wastes originate principally from the plants producing food and kindred products, textile products, paper and allied products, lumber and wood products and some of the chemical plants.

There are 63 industries producing inorganic wastes that discharge directly to watercourses. The inorganic wastes are from chemical plants, primary metal industries, metal fabrication, the production of petroleum and coal, the manufacture of rubber products, and mining.

The industrial wastes produced by 695 industries have not as yet been determined.

These data indicate that the total known liquid organic wastes discharged to the watercourses has a population equivalent of approximately seven million, with industries contributing more than one half this total. It is also evident from tables A and B, that the reported amount of pollution discharged to the watercourses is probably less than 50 percent of the actual amount of pollution discharged. The data used in compiling table B were the best available, but are incomplete for most sub-basins and completely lacking in others. The Water Pollution Control Authority of the State of Georgia has not supplied information on sources of industrial pollution. The data for Georgia on industrial sources of pollution included in the tables were obtained from "Manufacturers of Georgia", a publication prepared by the Georgia Agricultural and Industrial Board, and supplemented by information from the Georgia State Department of Commerce.

Large quantities of industrial wastes are discharged in the Piedmont Plateau regions of the sub-basins and in the northern portion of Alabama lying within the basins. The James, Roanoke, Neuse, Yakdin, Catawba, Congaree, Chattahoochee, Coosa and Warrior River Sub-Basins are the most highly industrialized watersheds in this area. State and basin-wide surveys and studies will be necessary before an adequate appraisal can be made of the industrial and municipal waste situation in the basins.

The streams rising in the mountains and the upper part of the Piedmont Plateau carry heavy silt loads. This type of pollution has not been considered in detail in this report. The loss of top soil from the land is an economic loss not only to the farmers but to the basins as a whole. Active soil conservation programs of the Department of Agriculture through the reestablishment of woodlands and improved land utilization are reducing the amount of top soil lost. Erosion control can be justified on the basis of the protection it affords farmlands. However, it is also important in pollution control, since silt results in serious losses of fish and wildlife resources, and in reduced recreational potentialities.

The use of organic insecticides in agriculture is another potentially serious source of pollution. Recently insecticides, washed into some Alabama streams by rainfall and runoff from fields dusted to control cotton insects, were responsible for killing large numbers of fish.

There is some oil production in the area, but the pollution which may result from these operations has not been considered in detail as no oil field pollution problems have been reported. The State of Alabama has leased approximately 600,000 acres of State land under Mobile Bay to a company which proposes to explore, prospect, drill or mine for oil, gas, all forms of petroleum products and sulphur. Several oil and gas fields have been developed in the Pearl River Sub-Basin in Mississippi during the past decade. Pollution by oil field wastes may become a problem and the water pollution control legislation of the States involved should include provisions to control the discharge of brines and oil wastes.

There is coal mining in Alabama, phosphate mining in Florida, and some mining of other minerals throughout the basin. There are no reported pollution problems resulting from acid mine drainage. Considerable pollution has resulted from phosphate mining activities in the past and the Florida Water Pollution Control Agency is making stream surveys to determine the extent of pollution from this activity.

Table A. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	716	3,525,508	3,297,384
Having population data available (Data on pollution load to watercourse incomplete or not available)	[a] 428	3,065,231	Not applicable.
Total	[b,c] 1,172	6,590,739	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

[a] Includes one municipality also listed as having data on pollution load discharged to watercourse, for a part of its population.

[b] Includes 29 municipalities for which no population served or pollution discharged to watercourse figures are available. Total adjusted to correct for duplication noted in footnote (a).

[c] Does not include seven municipalities having a total population of 7,460 that require complete sewerage systems.

Table B. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	162	3,578,814
Producing organic wastes	208	Undetermined
Producing inorganic wastes	[a] 63	Not applicable
Producing wastes of undetermined type	[b] 695	Undetermined
Total	[c] 1,112	--

*Industries having separate outlets and discharging wastes directly to watercourse.

[a] Includes sixteen plants also producing organic wastes.

[b] Includes industries in Georgia (only those types normally considered to discharge wastes with polluting characteristics) based on information obtained from "Manufacturers of Georgia" prepared by the Georgia Agricultural and Industrial Board and Supplemented by information from the Georgia State Department of Commerce. Population equivalents and discharge points of pollution in Georgia have not been reported by the State Water Pollution Control Agency.

[c] Total adjusted to correct for duplication noted in footnote (a).

DAMAGES TO WATER RESOURCES FROM POLLUTION

No attempt has been made to evaluate in dollars the damages to water resources, because the data available are too incomplete. Even if more adequate data were available, a dollar evaluation of all damages would be difficult if not impossible. Some damages can be accurately estimated, such as additional cost of development and operation of water supplies; while others, such as destruction of fish and wildlife which influence recreational and esthetic values, cannot be readily estimated.

The principal pollutants in most of the sub-basins are the industrial and municipal wastes. Heavy silt pollution in all of the rivers flowing through the Piedmont Plateau is also a major problem, and in some sub-basins is more of a problem than industrial or municipal wastes. Most of the water courses receive some agricultural pollution made up of drainage from livestock feed lots, dairy barns, pig pens, manure heaps, and other farm refuse. Insecticides, sprays and dips may also add to the pollution of the streams. Silt in the Savannah River has been estimated to increase water treatment costs of those communities taking water from the river by $4,900 annually. Reservoir sedimentation is estimated to result in $19,200 damages annually on this river.[4]

Pollution damages are greatest in the more highly developed areas where the streams have been overloaded and pollution control has not kept pace with industrial and urban development. These areas include parts of the Dan (tributary of the Roanoke River), Neuse and Catawba-Wateree Rivers where water supplies are damaged; the Warrior and the mid-section of the Coosa Rivers where future water supplies are jeopardized; and the Roanoke and Yadkin Rivers where municipal sewage in populous industrial areas is affecting the quality of downstream potential sources of industrial and municipal water supplies. These rivers, and others, have polluted zones where swimming is potentially dangerous because of high coliform counts.

The available data will not permit a detailed accounting of all the water pollution damage effects in the basins, but it does indicate that comprehensive water pollution control programs are needed to abate existing pollution and prevent additional damage to the water resources.

Many instances are on record where pollution has prevented shellfishing and resulted in direct economic loss, particularly to oyster fishermen. Oysters occur in the river estuaries, bays and sounds along the entire coast of the basins. There is hardly a major river estuary in this entire region which does not have areas where the taking of oysters is prohibited because of pollution. Over 6,000 acres of oyster beds have been condemned along the North Carolina coast alone. In 1947 there was a total of 139,478 acres or 232 square miles of commercial shellfish growing beds in Florida waters which had been condemned by the Florida State Board of Health because of pollution. The average annual income of the shellfish industry in that State is approximately $1,700,000. The industry has estimated that opening the condemned areas of Pensacola Bay alone would increase the harvest to something like $4,000,000 per year.[5]

In some areas swimming beaches have been condemned because of pollution. A survey in 1942 showed that the bathing beach at Pascagoula, Miss., was not safe for bathing. The water quality of certain beaches at Pensacola, Fla., and at Winton, N. C., on the Chowan River has been degraded as evidenced by high coliform concentrations. At other points along the coast of the basins near large population centers beaches have been developed directly on the ocean only, rather than on bays, partly because the former sites are generally pollution free.

Industrial pollution has been a factor in reducing recreational and commercial fishing in some instances. Prior to the time that voluntary action was taken by the Camp Manufacturing Company (paper mill) at Franklin, Va., there were reports of fish kills in the Blackwater River. More recently large numbers of fish were killed below a kraft paper mill outfall near Macon, Ga. Industrial pollution discharged directly into Back Bay at Gulfport, Miss., is said to have damaged sport fishing, as has clay silt which has escaped into the Peace and Alafia Rivers of Florida, as a result of phosphate mining activities. Damage to fish life has also resulted from the discharge of industrial wastes in some of the tidal waters of Nassau County, Florida.

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[4] Data supplied by Soil Conservation Service, U. S. Department of Agriculture.

[5] "Florida Health Notes" published by Florida State Board of Health, October 1947.

During the summer of 1950, agricultural insect control activities resulted in pollution and extensive loss of fish life in a number of rivers. This loss resulted from the use of several organic insecticides in a cotton growing region and was associated with rainfall which washed the insecticides from the soil into watercourses of the region. Considerable apprehension has been felt about the potentialities of this situation, since the insecticide might pass into the water supplies in cases where water from surface sources is partially or improperly treated. With the increasing amounts of these chemicals available for use and emphasis being placed on agricultural production, especially of cotton, further difficulty from this source is anticipated.

Rice Creek, into which the Hudson Pulp and Paper Corporation discharges wastes at Palatka, Fla., is greatly affected from the point of waste discharge two and a half miles to the mouth of the creek. An area of the St. Johns River approximately one and two tenths miles long by a quarter of a mile wide near the mouth of the Creek is also affected intermittently as indicated by dissolved oxygen and biochemical oxygen demand determinations. Municipal and industrial pollution of the Neuse River is increasing the cost of development of needed additional water supply for Raleigh, N. C. The State Board of Health cannot permit use of this stream, which flows near the city, for domestic supply. The city is therefore forced to use a source in a more distant river basin.

Salt water intrusion into underground aquifers is of great concern in Florida where most of the water supplies are obtained from ground water. This has been caused by drainage of swamps, increased water use due to industrial expansion, and uncontrolled pumping. The drainage of fresh water lakes is now controlled to prevent salt water intrusion. The pumping of wells is also controlled to prevent excessive drawdown of the fresh water table.

The subsurface discharge of wastes, a common means of disposal of both industrial and municipal wastes in many parts of Florida, has created problems by the pollution of underground waters. This practice has been stopped where public water supplies are involved.

Domestic pollution in Biscayne Bay and Hillsborough Bay in Florida has resulted in blackening hull paint on ships. Hydrogen sulphide generated in Hillsborough Bay also has resulted in reduced property values adjacent to the bay as a result of its affect on house paint. This latter condition is now being corrected.

BENEFITS RESULTING FROM POLLUTION PREVENTION AND ABATEMENT

There are numerous benefits resulting from pollution prevention and abatement programs. Many of these are of a local nature. Other benefits are basin-wide. Tangible monetary benefits to all water uses will come as a natural result of pollution control.

Polluted waters are always a threat to public health from the standpoint of downstream water supplies and bathing. A tangible benefit in the form of reduced cost of water treatment is realized by treatment of wastes. There is also the intangible benefit to public health through treatment of sewage by reducing the possibility of water-borne diseases.

The public health significance of sewage pollution in shellfish waters has been definitely established and tangible benefits result from pollution prevention and abatement in these shellfish areas. Construction of three sewage treatment plants since 1948 in the Hampton Roads area of Virginia region has opened two-thirds of the waters for taking of oysters that previously had been closed by State order. Improved operation of sewage treatment facilities at Biloxi, Miss., has permitted opening of some oyster beds in the Biloxi Bay that had been closed because of polluted waters.

The benefit resulting from silt pollution prevention is tangible. In one sub-basin alone, the estimated average annual monetary benefit from a proposed program that would reduce soil erosion amounts to over $11 million, of which the savings in reduction of reservoir sedimentation and water treatment costs is $72,000 and $42,000, respectively.[6] Silt in the streams hinders fish and wildlife propagation and reduces the use of the waters for recreational purposes. Silt deposits at the mouth of the streams result in expensive dredging operations to keep the harbors and channels open for navigation.

Corrosive pollutants in waterways and harbors reduces effectiveness of hull paint on ships and causes serious corrosion of harbor facilities. Considerable tangible benefit is derived by abatement of such pollution in waterways and harbors.

The poor quality of waters in some bays and watercourses has impaired their use for recreational purposes and deprived many residents and tourists of needed recreational areas. Restoration of clean waters by pollution control will result in recreational use and an increased economy to the area.

Ground water supplies are limited in the Piedmont Plateau and municipalities and industries in need of supplementing their supplies must rely on surface waters. Raleigh, N. C., requires additional water, but due to pollution on the upper Neuse River, the State Board of Health cannot permit use of this stream that flows near the city. Municipalities benefit through pollution abatement and control by being permitted to develop nearby water sources, thus avoiding the excessive cost of obtaining water from great distances.

Industries benefit by the utmost utilization of their raw materials and recovery of wastes that can be used as by-products. By prevention of waste and control of spillages, industries have benefited through increased production and resultant revenue. During conferences between representatives of the Alabama Water Improvement Advisory Commission and management of a paper mill to be constructed on the Coosa River, the latter stated that waste spillage control and other saving devices would be installed as a part of their waste treatment program. Installation of these devices has reduced the quantity of waste reaching the treatment plant and has benefited the industry by a saving of raw materials and a lower capital investment required for the waste treatment plant.

Meat packing, milk products and food processing plants can also materially reduce the cost of waste treatment by practicing good housekeeping and recovery of raw materials. Not only is the cost of waste treatment reduced, but in some industries these practices have resulted in additional profit.

Benefits are realized in downstream riparian property values by the provision of adequate waste treatment facilities. Where pollution has reduced property values, the elimination of the cause for depreciation will result in a definite tangible benefit.

General benefits to public and private interests resulting from water pollution control are both tangible and intangible. They include preservation of one of the most valued natural resources so necessary to growing population and expanding industrial economy.

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[6] Data supplied by Soil Conservation Service, U. S. Department of Agricultur .

POLLUTION PREVENTION MEASURES IN EFFECT

Five hundred and thirty-nine or 45 percent of the 1,172 sewered communities have 633 primary treatment plants with a combined population served of 2,123,500. Two hundred and forty-four municipalities or 20 percent provide 269 secondary treatment plants serving a population of 1,262,400. Four hundred and fourteen municipalities or 35 percent, serving a population of 3,205,000, discharge municipal sewage without treatment. However 15 of these municipalities provide primary treatment and five others provide secondary treatment for part of their wastes. Included in these figures are 29 population centers for which no population data are available. There are two sub-basins, the Altamaha and the Apalachicola, in which all of the sewage from a total of 33,960 people served receives some degree of treatment.

Three hundred and sixty-four (or slightly more than 40 percent) of the 902 existing municipal waste treatment plants are adequately designed with relation to capacity and degree of treatment. Three hundred and sixty treatment plants (40 percent) are reported as inadequate either in capacity or degree of treatment. The adequacy of the remaining 178 (20 percent) has not been determined. Four hundred and eighty-eight (54 percent) of the existing plants are satisfactorily operated, while the operation of 205 (23 percent) is reported as unsatisfactory. The remaining 209 plants (23 percent) are undetermined as to adequacy of operation.

The reported existing industrial waste treatment facilities are classified by type of industry in table D. Seventy-five of the 1,112 industrial plants discharging wastes directly to watercourses provide some treatment for their wastes. Two hundred and fifty-six of the industries are reported as having no waste treatment facilities. The status of waste treatment for the other 781 is undetermined.

The capacity and degree of treatment is satisfactory for 35 of the 75 industrial waste treatment facilities, unsatisfactory for 12, and undetermined for the remaining 28. The operation of these plants is satisfactory for 39, unsatisfactory for 7 and undetermined for 29.

The existing municipal and industrial waste treatment works are shown on map no. 2. The adequacy of these treatment works with relation to their capacity and operation are summarized in table E.

All of the State agencies review the plans and specifications for all proposed waste treatment facilities in their respective States.

Approval of the plans is based on the degree of treatment required to prevent pollution. Some of the States in the Southeast Drainage Basins are developing State-wide pollution control programs based on stream, waste, and water use studies. It is desirable that all States develop similar programs, so that State boundaries will have little or no effect on the development of interstate water pollution control programs.

Several of the State water pollution control agencies have public information and education programs which have served to create increased public desire for pollution abatement. The publication "Clean Streams in Georgia" by the Georgia Department of Public Health is an excellent example of one of the ways these effective programs are being implemented.

Existing State Water Pollution Control Legislation

Water pollution control legislation in the nine States in the basins varies from recently enacted comprehensive legislation to scattered statutory provisions dividing the authority among State agencies.

The following analysis presents briefly the salient features of water pollution control legislation of the various States in the Southeast Drainage Basins. It is based on previous analyses of State legislation which were reviewed by the various States and used in the development of a Suggested State Water Pollution Control Act which was subsequently endorsed by the Council of State Governments and recommended to the States for favorable consideration.

Five of the nine States in the Southeast Drainage Basins--Alabama, Louisiana, South Carolina, Tennessee, and Virginia--have established State boards or commissions which have general water pollution abatement, prevention and control powers and duties. In Florida, the State Board of Health is charged with the general control of water supply and sewage and treatment systems, and the control of pollution of the water of the State as it affects public health. The Commission of Game and Fish has authority to prohibit the placing of deleterious matter into fresh water which may injure fish, and the State Board of Conservation may issue regulations which are designed to prevent action in one watershed from adversely affecting surface or underground water supply in another watershed. In

Georgia, the State Board of Health has water pollution control functions incidental to its general supervision of all matters relating to the preservation of the life and health of the people. Mississippi has divided State water pollution control functions between the State Board of Health and the Game and Fish Commission. In North Carolina, the State Board of Health and the Department of Conservation and Development have water pollution control functions, and a State Stream Sanitation Committee has been established to coordinate the activities of the Board of Health and the Department of Conservation and Development and to conduct Statewide water pollution control planning.

Of the five States which have established boards or commissions having general water pollution abatement, prevention and control functions, Alabama, South Carolina, and Tennessee have the mixed type composed of ex-officio members representing State government and members representing affected interests; Louisiana has a commission composed entirely of ex-officio members representing State departments; and Virginia provides for all members to be appointed by the Governor on the basis of merit.

Four States--Alabama, South Carolina, Tennessee, and Virginia--provide for an executive officer to be in charge of the water pollution control program.

Alabama and South Carolina have given their water pollution authority the specific statutory duty to develop comprehensive water pollution control programs for their States. In Alabama, Louisiana, Mississippi (Game and Fish Commission), South Carolina, Tennessee, and Virginia, the water pollution authorities have the statutory power to establish water quality standards, and in Alabama, South Carolina and Tennessee the water pollution control authorities, in addition, have the statutory duty to classify waters.

By statute, Alabama, Florida, South Carolina, Tennessee, and Virginia require permits after examination of plans and specifications for all construction of municipal sewerage systems and industrial waste treatment works. In Mississippi, plants discharging industrial waste are required to secure permits from the Game and Fish Commission. In North Carolina,[7] only State institutions and towns are required to procure permits prior to the construction of sewage systems and treatment works and extensions thereof.

All States in the basins are authorized to issue rules and regulations relating to water pollution control. Only the Mississippi Game and Fish Commission is required to hold hearings before such issuance. In Alabama, Louisiana, Mississippi (Game and Fish Commission), South Carolina, Tennessee, and Virginia, the water pollution control authorities are specifically authorized by statute to issue orders, after hearings, relating to pollution abatement and control. In Tennessee, enforcement powers are suspended pending a report of the Stream Pollution Study Commission, which is charged with recommending a specific program of pollution control during the five-year period ending June 30, 1956.[8]

Alabama, Louisiana, Mississippi (Game and Fish Commission), South Carolina, Tennessee, and Virginia have specific statutory authority to hold administrative hearings. The water pollution control authorities of Alabama, Mississippi (Game and Fish Commission), South Carolina, and Tennessee may issue subpoenas and administer oaths, and the Louisiana Stream Control Commission may administer oaths in connection with such hearings. In Alabama and South Carolina, a mileage fee for witnesses is authorized.

Louisiana, South Carolina, and Tennessee do not provide for any exemption from their water pollution control statute. However, in South Carolina, orders for the discontinuance of existing discharges into marine districts may not be entered into until five years after service of the order. In Alabama, "industrial streams" (including some specifically designated by statute) are exempted from the water pollution control statutes. The Alabama statutes further provide that correction of pollution existing prior to August 25, 1949 and not creating a health hazard is subject to legislative approval. In Mississippi, the Game and Fish Commission does not have any authority relating to pollution control over the Mississippi River, non-navigable water, or waters which are land-locked and privately-owned. Municipalities of that State discharging domestic sewage into waters in 1946 are now subject only to "reasonable regulations" of the Game and Fish Commission, and municipalities which empty sewage into creeks twenty-five miles long are subject only to health control. In Virginia, Sanitation District Commissions are normally not under the jurisdiction of the State Water Pollution Control Agency, except that this agency may order the commissions to obtain operating results which conform with the agency's requirements.

Specific legislation that would enable all States within the area to develop comprehensive

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[7] The 1951 general assembly of North Carolina enacted a new water pollution control act creating a State Stream Sanitation Committee within the State Board of Health.

[8] The 1951 Tennessee General Assembly amended the stream pollution act and reestablished the authority of the board to issue orders for the correction of stream pollution.

Table C. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	[a] 539	633	2,123,518
Secondary	[b] 244	269	1,262,375
No treatment	[c] 414	--	3,204,846

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

[a] Includes seven municipalities for which no population figure is available.

[b] Includes 11 municipalities for which no population figure is available and five municipalities also listed under primary treatment.

[c] Includes 11 municipalities for which no population figure is available, 15 municipalities also listed under primary treatment and five municipalities also listed under secondary treatment. Does not include seven municipalities having a population of 7,460, for which complete sewerage systems are required.

water pollution control programs and permit interstate cooperation by compacts would be desirable. Uniformity of policy, procedure, and planning is essential to the development of comprehensive basin-wide programs.

The soil conservation measures now being applied by land users in cooperation with soil conservation districts and forest management are important means of controlling erosion, thus reducing silt pollution in streams.

Table D. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	433	18	97	318
Textile mill products......	179	26	82	71
Lumber and wood products...	9	0	4	5
Paper and allied products..	42	6	21	15
Chemical and allied products.................	[a] 364	[b] 13	[c] 27	324
Product of petroleum and coal.....................	16	0	6	10
Rubber products............	1	0	0	1
Leather and leather products.................	7	1	1	5
Primary metal industries...	3	0	3	0
Fabricated metal products..	9	1	2	6
Miscellaneous..............	43	6	16	21
Mining.....................	10	5	0	5
Total[d].................	1,112	75	256	781

*Industries having separate outlets and discharging wastes directly to watercourse.

[a] Includes 2 plants also listed in textile mill products and 2 plants also listed in paper and allied products.

[b] Includes one treatment plant which serves two types of industry and is also listed under paper and allied products.

[c] Includes 2 plants also listed under textile mill products and one plant also listed under paper and allied products.

[d] Totals adjusted to correct for duplications noted in footnotes, a, b, and c.

Table E. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	902	364	360	178	488	205	209
Industrial	75	35	12	28	39	7	29

*The Georgia Water Pollution Control Agency has not furnished information for the above table. Accordingly, all Georgia waste treatment plants are classified as undetermined.

POLLUTION PREVENTION MEASURES REQUIRED

In the development of comprehensive water pollution control programs, especially for the 22 interstate sub-basins, complete cooperation is needed among the States. The details of field study should be agreed upon to assure that all the data essential to the development of action programs are obtained for the entire drainage basins. The close working relationship desirable can be established best through interstate compacts. The States of the Southeast Drainage Basins have no interstate water pollution control compacts at present. Such compacts would assure the development of uniform programs.

Table G summarizes the municipal and industrial waste treatment requirements in the basins as reported by the State water pollution control agencies.

There are 654 municipal waste treatment projects known to be required to serve a total population of 3,869,735. These projects include 466 new plants, 147 additions or enlargements to existing plants, and replacement of 41 existing plants. Of these 654 required projects nine are to serve population centers of over 100,000, 25 will serve populations of over 25,000 and 79 will serve centers with populations over 5,000, 89 will serve populations of from 2,500 to 5,000, 212 from 1,000 to 2,500 persons, 141 from 500 to 1,000 persons and 99 will serve population centers of less than 500. No projects are required at present for 401 municipalities having a total population of 1,448,900. Disregarding the 282 municipal sources of pollution for which the project requirements are undetermined, the known project requirements indicate that only 38 percent of the sewered municipalities representing twenty-seven percent of the sewered population adequately treat their sewage. Considering these 282 sources only 30 percent of the sewered municipalities representing twenty-two percent of the sewered population have adequate waste treatment facilities.

Of the 179 industrial establishments with direct waste discharge to watercourses for which treatment requirements have been determined, 110 are in need of new plants, ten require additions to or enlargement of existing plants and 59 require no project. These 179 industries represent only 16 percent of the industrial sources of pollution which may require some form of treatment. Project requirements for 933 industries have been reported as undetermined. These figures indicate the program for abatement of industrial pollution is only in its early stages.

The known project requirements as reported by the States for each sub-basin are listed in tables I_1 through I_{46} in part II of the report. These lists, prepared as of July 1, 1950, are subject to change as additional information is obtained by the States.

The available information in regard to status of required projects for pollution abatement is summarized in table H. Definite action has been taken at 156 municipalities to provide sewage treatment facilities. Of these, abatement has been ordered at 10, plans are under preparation for 88, plans are approved for 20, 28 plants are under construction, and construction is awaiting financing at 10. No formal action has been taken at 483 municipalities and the status of 297 others is undetermined. Two industrial waste treatment plants are under construction and plans are under preparation for two others. No formal action has been taken with 223 industries and the action status at 826 is undetermined.

Table F shows the progress in pollution abatement for the period 1946 through 1949. There were 99 municipal treatment projects and 13 industrial waste treatment plants constructed during this period. The number of municipal plants constructed per year has shown considerable increase; but at the 1949 rate of 55, nearly 12 years would be required to complete the presently known program for municipal pollution abatement which has been established by the State water pollution control agencies. The rate of progress for reduction of industrial waste pollution is low. Based on 1949 rate of industrial waste treatment works construction, 17 years would be required to complete the present program. This does not consider possible requirements at the 282 municipalities and 933 industries where treatment needs are as yet undetermined.

Projects required by sub-basins are shown on map no. 3. The projects required in each sub-basin include new treatment plants, additions, enlargements and replacement of existing treatment facilities. Project requirements for abatement of pollution having their source in Georgia have been indicated as undetermined, since the Georgia Water Pollution Control Agency did not submit such information for inclusion in this report. Detailed data on sources of pollution in each sub-basin are presented in tables G_1 and H_1 thru G_{46} and H_{46} of part II of this report.

On the basis of project needs as indicated in table G, the approximate capital cost of presently known municipal treatment projects for pollution abatement in the basins is estimated to be $108,000,000. This does not include requirements for municipal waste plants listed as undetermined.

The lack of data as to the amounts of pollution discharged to the watercourses from 428 municipal sources of pollution and as to the types and amounts of industrial wastes discharged from the 1,112 industrial plants makes it difficult to estimate the construction cost of all treatment works required to abate the existing pollution resulting from municipal and industrial waste discharges. However, on the basis of the sewered population of the 428 municipal sources of pollution not included in the above estimate it is estimated that the cost of remedial works needed by these sources will be approximately $100,000,000. The amount of pollution discharged to watercourses has been reported for only 162 of the 370 industrial establishments producing organic wastes. The wastes from these 162 plants are reported to have a population equivalent of over 3.5 million people. Based on the reported population equivalent of the organic wastes, the cost of constructing treatment plants for these wastes is estimated to exceed $150,000,000. The construction of waste treatment works needed to abate the pollution resulting from the discharge of organic and inorganic industrial waste from the remaining 948 industrial plants would probably cost in excess of $140,000,000. Considering all of the municipal and industrial sources listed by the State water pollution control agencies, the approximate construction cost of needed remedial work is estimated at $500,000,000.

Recognizing that these expenditures will take place over a period of years, the estimated costs will be increased due to added factors. These include additional annual obsolescence and rehabilitation requirements, needs of communities installing new sewer systems, normal population increases and industrial expansion, as well as allowances for presently undetermined needs.

Table F. Progress in pollution abatement

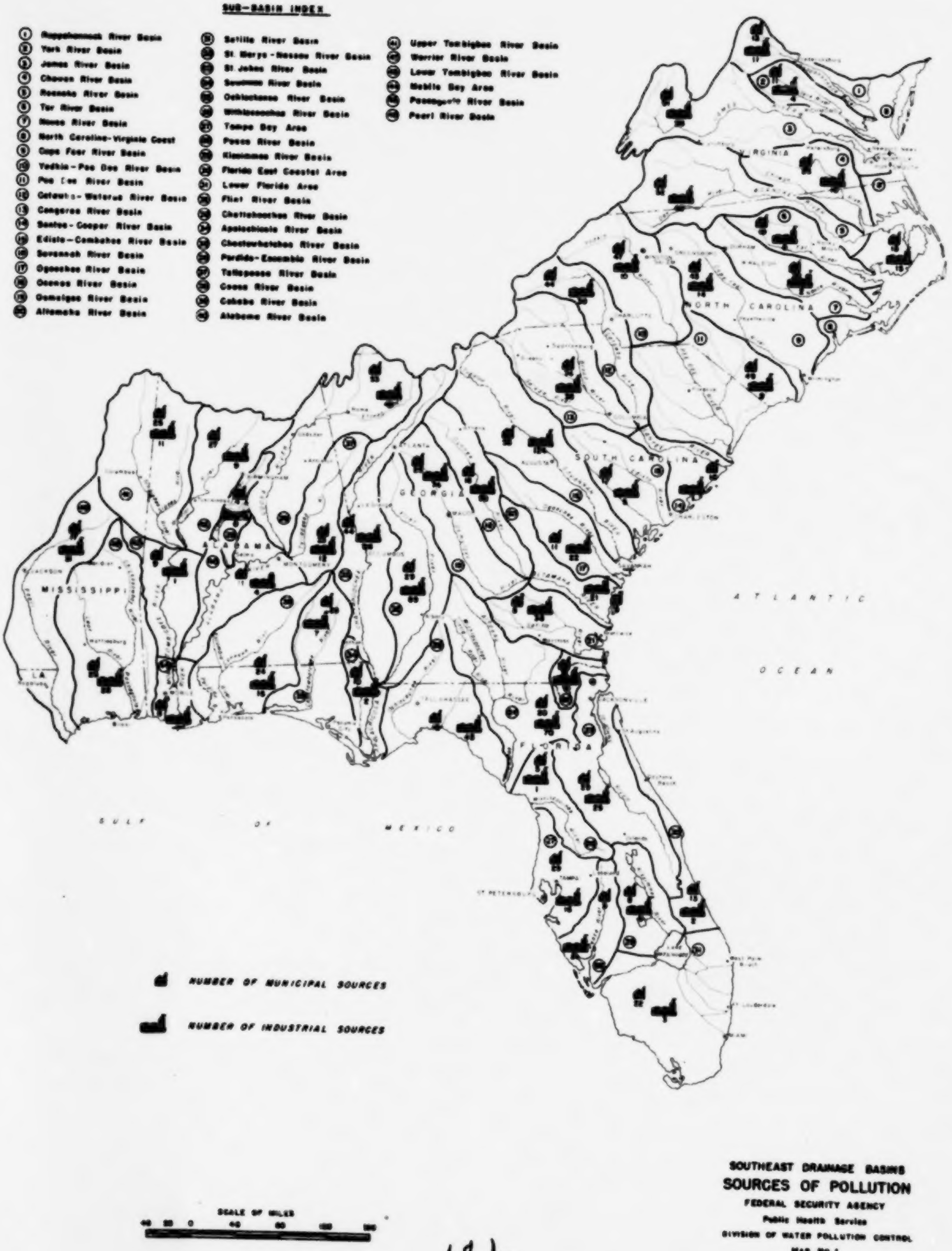
Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	3	2,425	0	--
1947	20	251,750	[a] 3	3,600
1948	21	260,030	[b] 3	21,000
1949	55	[c] 372,675	[d] 7	5,000

[a] Includes enlargement and improvement of facilities at one industry for which the amount of waste treated is unknown.

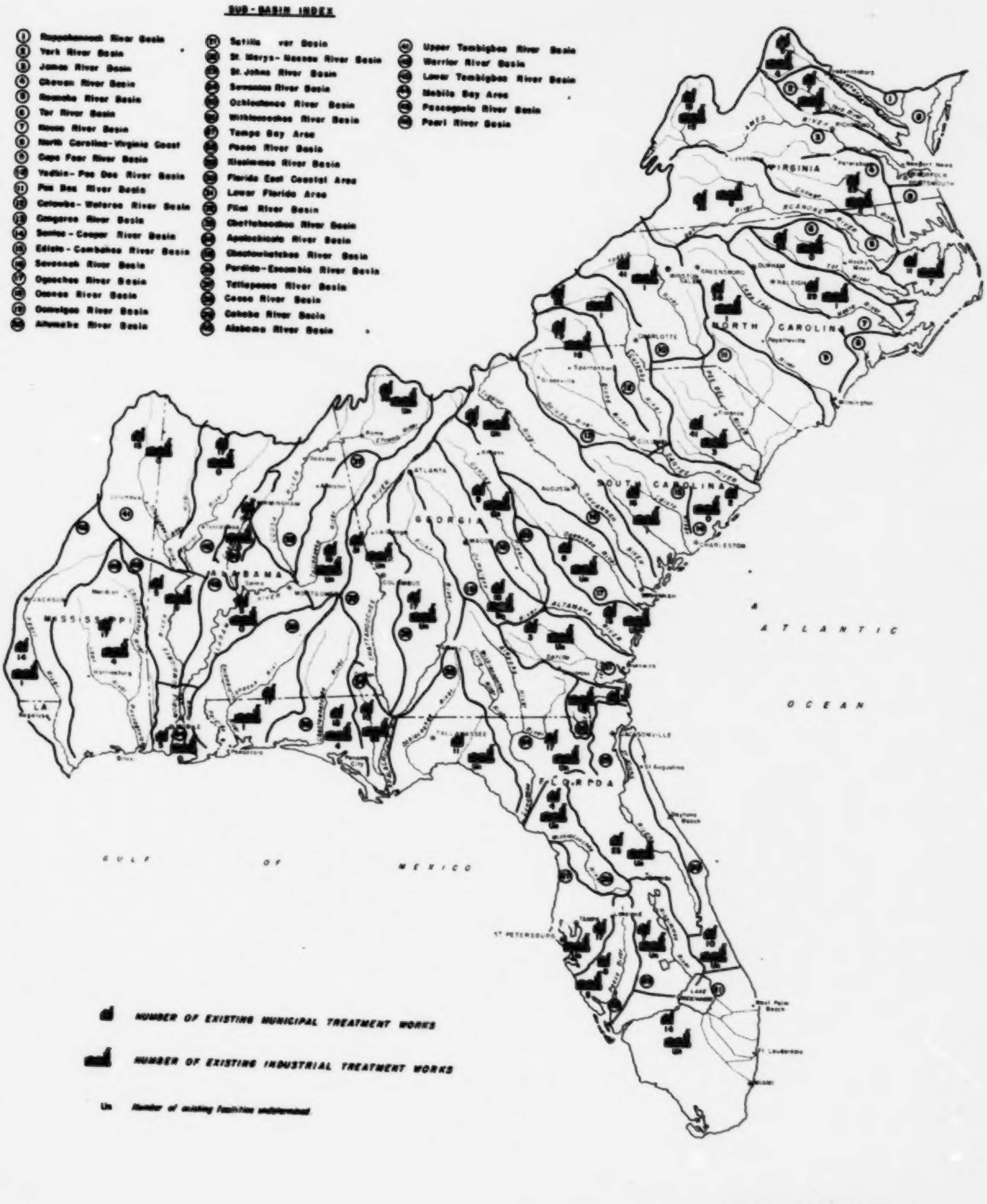
[b] Includes one plant for which waste treated (in terms of equivalent number of people) figures are not available.

[c] Includes enlargement of one treatment plant to a design population of 8,000, and one plant enlarged to serve a population of 300.

[d] Includes 4 industrial waste treatment plants for which the amount of wastes treated is not known.



SOUTHEAST DRAINAGE BASINS
SOURCES OF POLLUTION
FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 1

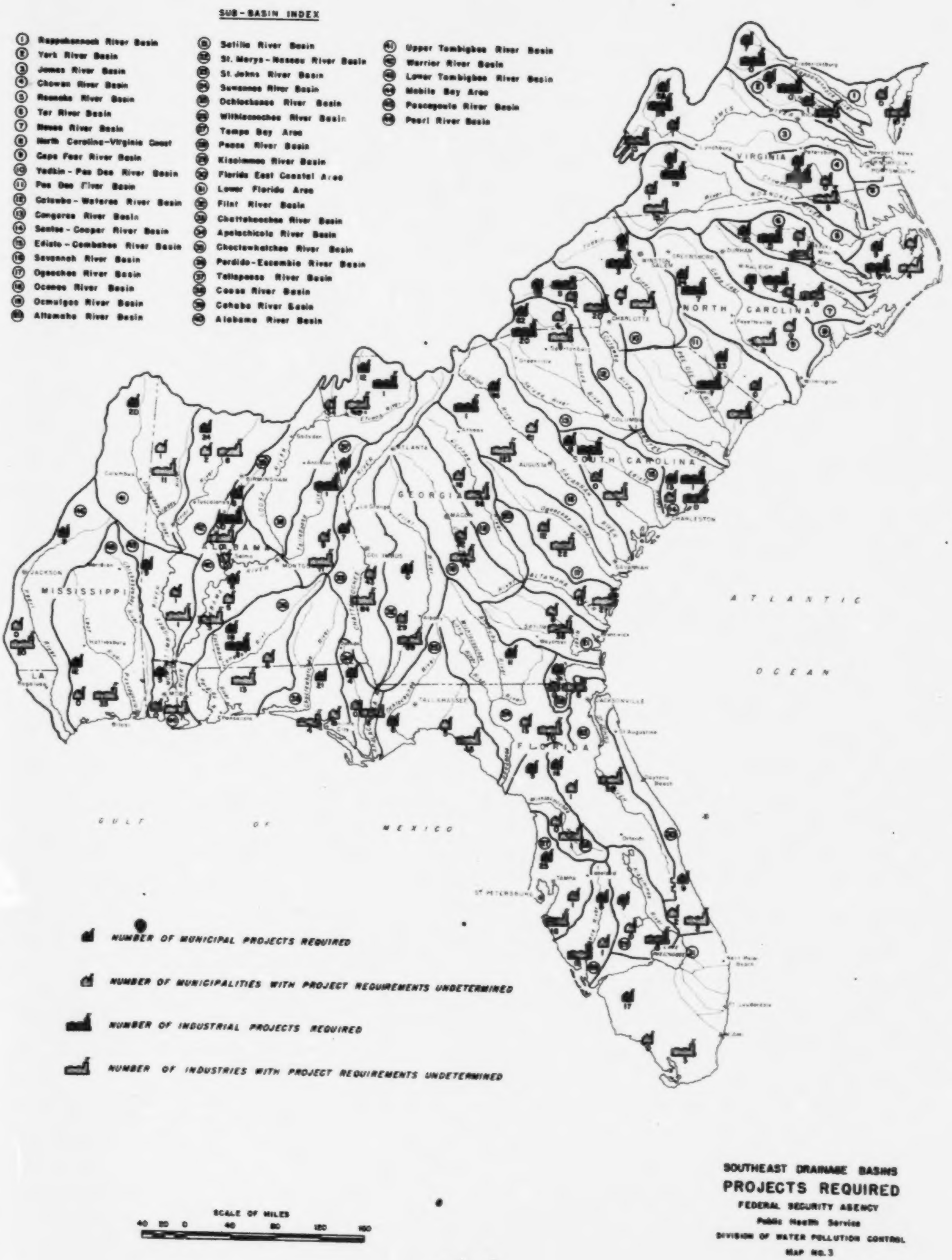


SOUTHEAST DRAINAGE BASINS

EXISTING TREATMENT WORKS

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 2

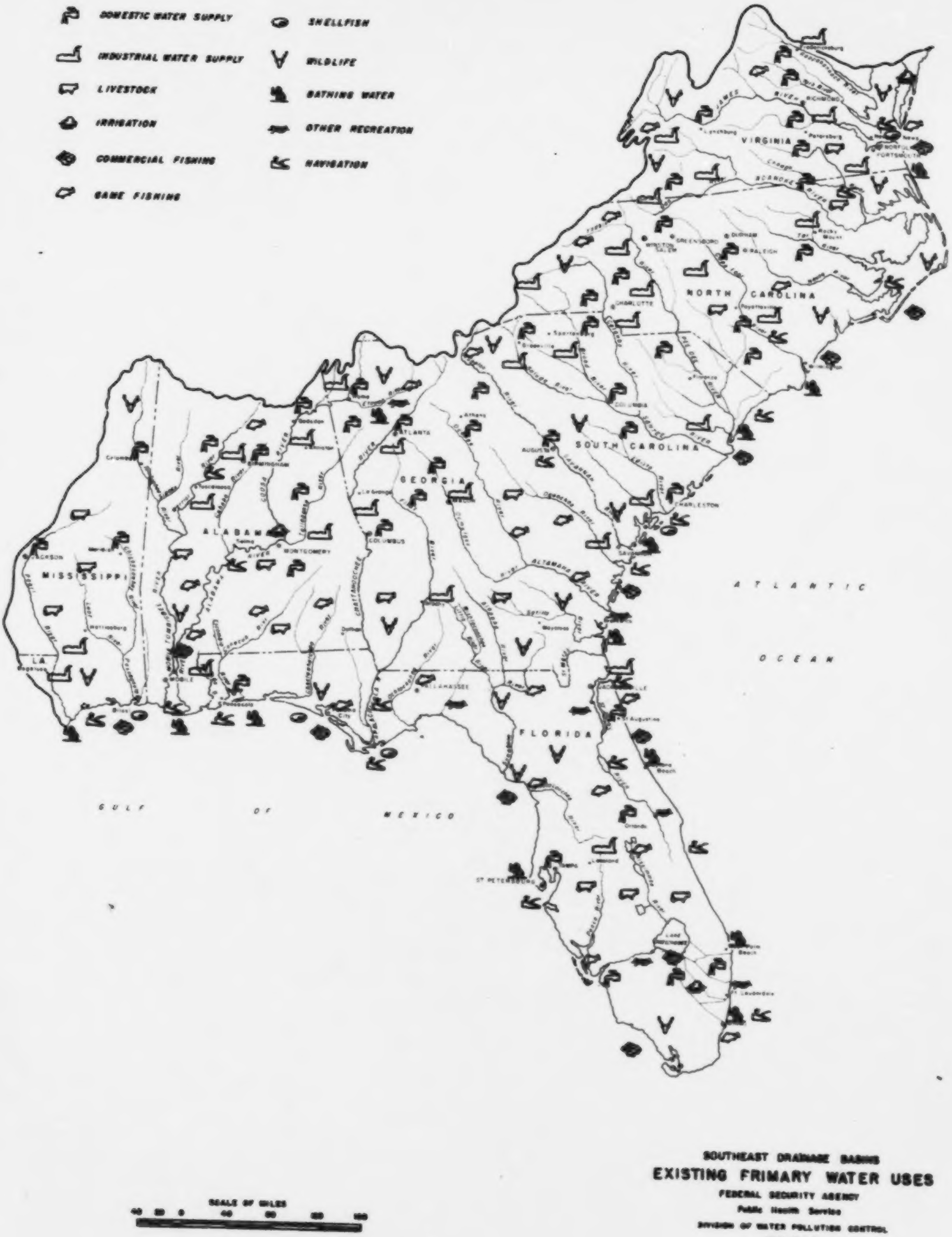
18C



SOUTHEAST DRAINAGE BASINS

PROJECTS REQUIRED

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 3



SOUTHEAST DRAINAGE BASINS

EXISTING FRIMARY WATER USES

FEDERAL SECURITY AGENCY
Public Health Service
DIVISION OF WATER POLLUTION CONTROL
MAP NO. 4

Table G. Requirements for municipal and industrial waste treatment plants*

Requirements**	Municipal		Industrial
	Number***	Population served by facilities	Number
New plant	[a,b] 466	2,728,268	110
Enlargement or additions to existing plant	[c] 147	838,307	10
Replace existing plant	41	303,160	0
No project required	[d] 401	1,448,934	59
Undetermined	[e] 282	1,279,530	933

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**For individual project needs refer to table I contained in each of the sub-basin discussions in part II of this report.

***"Number" column includes more project requirements than the total number of municipal sources of pollution. These additional projects are required for municipalities without treatment having multiple outfalls and to serve municipalities noted under footnote [b].

[a] Includes seven municipalities for which no population served figures are available.

[b] Includes seven municipalities having a population of 7,460 requiring complete sewerage systems not reported as sources of pollution on table A.

[c] Includes one municipality for which no population served figure is available.

[d] Includes nine municipalities for which no population served figures are available.

[e] Includes 12 municipalities for which no population served figures are available.

Detailed data regarding project requirements for each sub-basin are given in tables G_1 through G_{46}, part II of this report.

New plants: Includes 164 municipal plants classified as unsatisfactory and 10 plants undetermined in capacity that have been considered as requiring new plants rather than replacements.

Enlargement or additions to existing plants: Includes 22 municipal plants, now satisfactory as to adequacy, requiring enlargements or additions in order to provide for a higher degree of treatment.

Replace existing plant: Includes six municipal plants now satisfactory and three municipal plants undetermined as to adequacy that have been considered to require replacements to provide for a higher degree of treatment.

No project required: Includes seven municipal plants undetermined and 22 unsatisfactory in capacity, and 46 municipalities and 24 industries not having treatment facilities that are classified as requiring no project since the disposal of their wastes is considered adequate at the present time.

Note:

The Georgia Water Pollution Control Agency has not furnished information regarding project requirements; therefore, all Georgia sources of pollution are classified as undetermined.

Table H. Status of treatment works projects to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	483	223
Abatement ordered	10	0
Plans under preparation	88	2
Final plans approved	20	0
Construction awaiting financing	10	0
Under construction	28	2
Status undetermined*	297	826

*The Georgia Water Pollution Control Agency has not furnished information regarding status of treatment works; therefore, all the Georgia treatment plants are listed as undetermined.

SUB-BASIN REPORTS

RAPPAHANNOCK RIVER SUB-BASIN

General Description

The Rappahannock River Sub-Basin is bounded on the north and west by the Potomac River Basin, on the east by Chesapeake Bay, and on the south by the York and James River Sub-Basins.

The total drainage area of the Rappahannock River Sub-Basin is about 2, 948 square miles and lies entirely within the State of Virginia.

The headwaters of the Rappahannock, and that of its principal tributary, the Rapidan, lie on the eastern slopes of the Blue Ridge Mountains. The river flows in a general easterly direction across the Piedmont Plateau and the Coastal Plain to Chesapeake Bay.

The climate of the sub-basin is classed as humid with average annual rainfall varying from 41 inches to 46 inches. Except for summer storms, the rainfall is rather evenly distributed throughout the year. The mean temperature varies from 55° F. to 58° F. and the growing season averages about 250 days.

The total population of the sub-basin, according to the preliminary census of 1950 was about 110, 740, which was 13 percent urban.

Economic Development

The sub-basin contains two urban communities which comprise 13 percent of the population. The largest of these is Fredericksburg which has a population of 12, 143.

Farming is the chief economic activity of the sub-basin, with livestock and poultry raising, dairying and truck crop farming being the principal types. Industries are relatively few and scattered. These include a large organic chemical manufacturing establishment at Fredericksburg and a number of canneries and other food processing plants. Oystering and fishing are the major source of livelihood for the majority of the people in the coastal counties.

Use of Water Resources

There are fifteen public water supplies in the sub-basin serving a population of 21, 078. Three of these serving 17, 250 people are surface supplies.

Valuable commercial fisheries exist in the tidal estuary and along adjacent shores in Chesapeake Bay.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_1 through I_1 , inclusive.

Thirteen municipalities, 12 of which have a total sewered population of about 22, 000, discharge pollution to watercourses of the sub-basin. Nine of these municipalities, with a sewered population of 21, 020, discharge wastes having a population equivalent of 16, 075. The population equivalent of the wastes discharged by four other municipalities is not known.

Eleven industries discharge wastes directly to the streams of this sub-basin. The wastes from nine of these industries are organic and are known to contribute a pollution load to the streams of a population equivalent of approximately 60, 000. Of the two remaining industries, one discharges an unknown amount of organic wastes and the character of the wastes from the other is unknown.

Of the 13 municipalities, five have primary treatment plants serving 3, 720 people and four have secondary treatment plants serving a population of 5, 650. Of the 11 industries, only four have provided for waste treatment.

The design capacity for present day conditions of eight of the municipal treatment plants is satisfactory and of one is unsatisfactory. Operation of four of the municipal treatment plants is satisfactory, of two is unsatisfactory and that of three is undetermined. The design capacity of one of the industrial plants is satisfactory and that of three is undetermined. Operation at all four of the industrial waste treatment plants is undetermined.

No municipal or industrial waste treatment plants have been constructed during the period 1946-1949. Construction of four new municipal sewage treatment plants, three of which will serve a population of 12, 650, as well as additions to one existing municipal treatment plant serving 2, 000 people and the replacement of two others serving 2, 680 are required to abate pollution in the sub-basin. No project is required at six municipalities having a sewered population of 4,690 or for one industrial plant. Requirements are undetermined at ten industrial plants.

The status of abatement plans for seven municipalities and ten industries is undetermined.

Table A_1. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	9	21,020	16,075
Having population data available (Data on pollution load to watercourse incomplete or not available)	3	1,000	Not applicable
Total	***13	22,020	--

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to a watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Total includes one source of pollution for which no population served or pollution discharged figures are available.

Table B_1. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	9	60,000
Producing organic wastes	1	Undetermined
Producing inorganic wastes	**1	Not applicable
Producing wastes of undetermined type	1	Undetermined
Total	***11	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Also producing organic wastes

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_1. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	5	5	3,720
Secondary	4	4	5,650
No treatment	4**	--	12,650

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one additional municipality, with no treatment for which no population served figure is given.

Table D_1. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	9	3	6	0
Chemical and allied products..................	1	0	1	0
Miscellaneous..............	1	1	0	0
Total..................	11	4	7	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_1. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	9	8	1	0	4	2	3
Industrial	4	1	--	3	--	--	4

Table F_1. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_1. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	4**	12,650	--
Enlargement or additions to existing plant	1	2,000	--
Replace existing plant	2***	2,680	--
No project required	6	4,690	1
Undetermined	0	--	10

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one plant for which no population served figure is given.

***Two municipal plants, now satisfactory as to adequacy, require replacement in order to provide for a higher degree of treatment.

Table H_1. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	--	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	7	10

Table I_1. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
VIRGINIA			
Bowlers wharf:			
Food cannery	Not known	Undetermined	—
Culpepper:			
Slaughterhouse	Not known	Undetermined	—
Falmouth	300	New plant	—
Fredricksburg	12,250	New plant	—
Country Club	Variable	New plant	—
Chemical plant	Not known	Undetermined	—
Lancaster:			
Food cannery	Not known	Undetermined	—
Leedstown:			
Food cannery	Not known	Undetermined	—
Marshall	100	Replace plant	—
Creamery	Not known	Undetermined	—
Orange	2,580	Replace existing plant	—
Ottoman:			
Food cannery	Not known	Undetermined	—
Tomato cannery	Not known	Undetermined	—
Sperryville:			
Food processing plant	Not known	Undetermined	—
Tylerton	100	New plant	—
Urbana:			
Food processing plant	Not known	Undetermined	—
Warrenton	2,000	Additions to existing plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

YORK RIVER SUB-BASIN

General Description

The York River Sub-Basin is bounded on the northwest and northeast by the Rappahannock River Sub-Basin, on the east by Cheaspeake Bay, and on the south and southwest by the James River Sub-Basin. The sub-basin occupies about 2,728 square miles and lies entirely within the Commonwealth of Virginia.

The York River is formed by the confluence of the Mattaponi and Pamunkey Rivers which originate on the Piedmont Plateau. These streams are tidal up to the fall line. As late as 1936 this sub-basin was largely woodland with only a small portion under cultivation.

The climate of the sub-basin is classed as humid with average annual rainfall varying from about 40 to 46 inches. Except for summer storms, the rainfall is rather evenly distributed throughout the year. The mean annual temperature varies from 55° F. to 58° F. The growing season averages about 250 days annually.

The total population of the sub-basin based upon the 1940 census was approximately 81,235. The preliminary 1950 census reports indicate a population of 90,046.

Economic Development

The sub-basin contains only one urban community which comprises three percent of the sub-basin population. Farming is the chief economic activity of the region, with livestock, dairying, truck farming and poultry raising constituting the principal types. Industries are few and scattered. One large pulp plant is located at West Point. Oystering and fishing are major sources of livelihood near the York estuary and along the shores of Chesapeake Bay.

Use of Water Resources

There are 17 public water supplies in the sub-basin serving 8,141 people. Only one of these serving 2,000 persons is from a surface source.

Commercial fishing and oystering are of prime importance in the estuary of the York River and along the shores of Chesapeake Bay.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in Tables A_2 through I_2 , inclusive.

There are 11 sources of municipal pollution in the sub-basin. No population served data is available for three of these. The remaining eight serve 6,050 persons and their sewage is reduced to a population equivalent of 5,600 prior to discharging to streams. There are four industrial plants discharging waste to streams. One produces organic waste having a population equivalent of 110,000, three produce organic waste of undetermined quantity, and one of these also discharges inorganic waste.

Table A_2. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	8	6,050	5,565
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	--
Total	***11	6,050	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes three sources of pollution, consisting of U.S. Navy installations in York County, for which no population served or pollution discharged figures are available.

Of the eleven municipalities, two have primary treatment plants which serve about 300 persons. Five have secondary treatment facilities, two of which serve 500 persons. The population served by the remaining three is not given for military reasons. Four municipalities having a sewered population of 5,285 provide no treatment. None of the four industries have waste treatment facilities.

Of seven municipal treatment plants five are satisfactory, one is unsatisfactory, and one is undetermined with respect to design capacity and operation.

No municipal or industrial waste treatment plants have been constructed in the sub-basin during the period 1946-1949.

Five new plants are needed to serve a population of 5,420. No project is required at five communities. The needs are undetermined at one community, which has a sewered population of 130. The project requirements at four industries are undetermined.

Plans are under preparation at one community for the construction of treatment facilities and final plans have been approved for one other. The status of abatement plans is undetermined at four municipalities and four industries.

Table B_2. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	110,000
Producing organic wastes	3	Undetermined
Producing inorganic wastes	**1	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***4	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_2. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	2	2	265
Secondary	**5	**5	500
No treatment	4	--	5,285

*Includes incorporated or unicorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes 3 U.S. Navy installations for which population served data are not given.

Table D_2. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	2	0	2	0
Paper and allied products..	1	0	1	0
Fabricated metal products..	1	0	1	0
Total..................	4	0	4	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_2. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	7	5	1	1	5	1	1
Industrial	0	—	—	—	—	—	—

Table F_2. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_2. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**5	5,420	—
Enlargement or additions to existing plant	—	—	—
Replace existing plant	—	—	—
No project required	***5	500	—
Undetermined	1	130	4

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**One municipality, now inadequately treating wastes with an Imhoff tank, requires a new plant.

***Includes 3 U.S. Navy Installations for which no population served figures are given.

Table H_2. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	—	—
Abatement ordered	—	—
Plans under preparation	1	—
Final plans approved	1	—
Construction awaiting financing	—	—
Under construction	—	—
Status undetermined	4	4

Table I_2. Project list--municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
VIRGINIA			
Ashland........................	2,225	New plant	--
Hanover Industrial School.....	410	New plant	Plans under preparation
Louisa County..................	130	Undetermined***	--
Louisa (Municipality)..........	550	New plant	--
Milford:			
Food pickling plant.........	Not known	Undetermined	--
Metal cleaning plant........	Not known	Undetermined	--
Peaks Industrial School.......	135	New plant****	--
Walkerton:			
Food cannery................	Not known	Undetermined	--
West Point.....................	2,100	New plant	Plans approved
Pulp and paper plant........	110,000	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

***Has primary treatment plant at present.

****Due to local conditions, one municipality with a plant classified as unsatisfactory in capacity, has been considered as requiring a new plant rather than a replacement.

General Description

The James River Sub-Basin is bounded on the west and north by the Kanawha River Sub-Basin and Potomac River Sub-Basin, on the north by the Rappahannock and York River Sub-Basins, on the east by Chesapeake Bay, and on the south by the North Carolina - Virginia Coast Sub-Basin, and the Chowan and Roanoke River Sub-Basins.

The river system rises in the Great Valley of Virginia and flows in a general easterly direction through the Blue Ridge Mountains, the Piedmont Plateau and the Coastal Plain into the lower end of Chesapeake Bay. The total drainage area is 10,060 square miles, practically all of which is in the Commonwealth of Virginia, a small area of relatively minor importance being located in the State of West Virginia. Important tributaries are the Cow Pasture and Jackson Rivers, joining to form the James in the Alleghany Mountains near Clifton Forge, Va., the Rivanna and North Rivers above Richmond, and the Chickahominy and Appomattox Rivers below Richmond.

The mean annual rainfall varies from about 39 inches in the western part of the sub-basin to 45 in the eastern portion. A 12-year record at the U.S. Geological Survey gauge at Richmond, Va., where the watershed area is 6,757 square miles, indicates an average discharge of 7,244 cubic feet per second. The maximum discharge at this point was 175,000 cubic feet per second, and the minimum was 46 cubic feet per second.

These flow data do not include water diverted through the Kanawha Canal which returns to the river below the gaging station after use for the production of electric power. The 12-year flow record at U.S.G.S. station on the canal shows an average flow of 844 second-feet.

The mean annual temperature varies from about 54° F. to nearly 59° F. The climate is classed as humid.

The population of the sub-basin was 972,517 based on the 1940 census, 60 percent of which was urban. The preliminary 1950 census indicates the population to be 1,203,533 and to have remained 60 percent urban.

Economic Development

There are 20 urban communities in the James River Sub-Basin, seven of which have populations in excess of 25,000. The largest of these, Richmond, is the capitol of the Commonwealth.

Although the sub-basin is approximately 70 percent woodland, it is a heavy producer of agricultural products including tobacco, cotton, peanuts, corn, grains, fruits and truck crops. Norfolk and Princess Anne Counties are particularly important producers of truck crops which find a ready market in the nearby heavily industrialized Hampton Roads area. Isle of Wight County is a large producer of peanuts and principal products of the mountain valleys include apples and peaches.

The urban areas of this sub-basin are highly industralized. The larger industries being textile, pulp, chemical, shipbuilding, processed foods and the manufacturing of cast-iron pipe and building materials.

Hampton Roads, in the estuary of the James River, adjacent to which are located the cities of Norfolk, Portsmouth and Newport News, is one of the nation's finest harbors. In 1947 and 1948 it cleared almost half the total export tonnage shipped from all principal Atlantic Coast ports, a large part being coal.[1] Oystering is also of commercial importance in the estuary of the James River.

Use of Water Resources

There are public water supplies in the sub-basin serving a population of 817,078. Twenty-four of these are wholly or partly from surface sources and serve 777,990 people.

Recreational resources on the river have been little developed. Some water flow hunting occurs in the lower part of the sub-basin.

A number of small power dams have been constructed on the river. Other developments, primarily for hydroelectric power, have been proposed.

The estuary of the river is extensively navigated and extensive port facilities have been developed there. Commercial oystering is also important in this portion of the river and oyster bed management is practiced by individual operators. Commercial fishing is also done here.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_3 through I_3.

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[1] Commercial Statistics, Annual Report of the Chief of Engineers, U.S.A., 1948, Part 2.

There are 91 sewered communities in this sub-basin. Eighty-five of these have a population of 924,300 known to be served by sewers. No figures are available for the population served in the remaining six. Seventy-five of these communities, with a sewered population of 484,500, contribute pollution of an estimated population equivalent of 451,400 to the streams.

Fifty-six industries discharge their wastes directly to streams in this sub-basin. Ten of these produce organic wastes having a population equivalent of 862,300 and thirty-three others produce organic wastes of undetermined strength. Twelve, including two listed as producing organic wastes, produce inorganic wastes and the remaining three produce wastes of an undetermined type.

Twenty-one communities with a total sewered population of 470,800 are provided with primary sewage treatment facilities. Two others, the population served of which is unknown, have primary treatment plants. Secondary treatment is provided by 24 municipalities with a total sewered population of 36,370 and one municipality for which sewered population is unknown. The sewage of about 417,000 persons residing in 42 municipalities is discharged to streams without treatment. Untreated sewage from three other communities for which sewered population data is lacking is also discharged to watercourses.

Treatment of wastes is provided for at 15 of the 56 sources of industrial wastes and the treatment facilities of three other industries are undetermined.

Thirty-five of the existing municipal waste treatment plants are considered adequate, four are considered unsatisfactory and the adequacy of 12 others is undetermined on the basis of design capacity. In regard to operation 22 plants are considered satisfactory, two are unsatisfactory and the status of operation of 27 plants is undetermined.

During the period 1946-1949 ten municipal waste treatment plants were completed, to serve a design population of 483,500. Also during this period, one industrial waste treatment plant was built to treat wastes having a population equivalent of 28,200.

The requirements to abate pollution in this area include 54 new municipal treatment plants designed to serve a population of 441,015, enlargement of three existing plants to serve 17,400 persons and the replacing of one plant serving 250 persons. No projects are required at 36 municipalities having a sewered population of 465,350 (the connected population for two of these municipalities is undetermined). The requirements at one community with a connected population of 250 remain to be determined. To abate pollution from industrial establishments 38 new treatment plants are required. The requirements at 13 other industries are undetermined.

Plans for new projects are under preparation for 16 municipalities and one industry. The final plans for four municipalities have been approved. No formal action has been taken on abatement projects by 35 municipalities and 31 industries.

Table A_3. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	75	484,511	451,400
Having population data available (Data on pollution load to watercourse incomplete or not available)	***11	439,755	Not applicable
Total	****91	924,266	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns, significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one municipality also listed as having data on pollution load discharged to watercourse, for part of its population.

****Includes six municipalities for which no population served or pollution discharged figures are available. Total adjusted to correct for duplication noted in footnote marked thus,***.

Table B_3. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	10	862,300
Producing organic wastes	33	Undetermined
Producing inorganic wastes	**12	Not applicable
Producing wastes of undetermined type	3	Undetermined
Total	***56	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes two plants also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_3. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	**23	23	470,806
Secondary	***25	27	36,370
No treatment	****45	—	417,090

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two municipalities for which no population served figures are available.

***Includes one municipality for which no population served figure is available.

****Includes three municipalities for which no population served figures are available and two municipalities also included under primary treatment.

Table D_3. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	25	5	20	0
Textile mill products......	4	1	3	0
Paper and allied products..	8	1	6	1
Chemical and allied products.................	**8	2	**4	2
Leather and leather products.................	2	1	1	0
Primary metal industries...	1	0	1	0
Fabricated metal products..	1	1	0	0
Miscellaneous.............	9	4	5	0
Total.................	***56	15	***38	3

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes one plant also listed under textile mill products and one plant also listed under paper and allied products.

***Total adjusted to correct for duplication noted in footnote above.

Table E_3. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	51	35	4	12	22	2	27
Industrial	15	5	1	9	4	1	10

Table F_3. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	3	200,000	0	—
1948	2	182,500	1	28,200
1949	5	101,000	0	—

Table G_3. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**54	441,015	38
Enlargement or additions to existing plant	***3	17,400	—
Replace existing plant	1	250	—
No project required	****36	465,351	5
Undetermined	1	250	13

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes three municipalities for which no population data are available, four projects connecting two sewer systems into the Hampton Roads system and two others into the Portsmouth sewer system. Also included are two new plants at Norfolk and one at Charlottesville. Due to local conditions nine municipalities with plants classified as undetermined in relation to adequacy of capacity have been considered as requiring new plants rather than replacements. Two of these nine are the connections referred to above into the Hampton Roads system.

***Includes enlargement of two existing treatment plants at Charlottesville.

****Includes three municipalities for which no population served data are available, and a major part of the sewage from Norfolk for which no project is required.

Table H_3. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	35	31
Abatement ordered	—	—
Plans under preparation	16	1
Final plans approved	4	—
Construction awaiting financing	—	—
Under construction	3	—
Status undetermined	1	19

Table I_3. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
VIRGINIA			
Alleghany, County of	575	New plant	--
Beaumont Industrial School	350	New plant	--
Big Island:			
Industrial establishment	25***	New plant	--
Paper products	24,000****	Undetermined	--
Bland Sanitary District	3,000	New plant	Plans under preparation
Buena Vista	2,600	New plant	Plans under preparation
Paper products	Not known	Undetermined	--
Tannery	Not known	Undetermined	--
Charlottesville:			
Rivanna Creek area	11,000	New plant	--
Moores Creek area	8,000	Enlarge existing plant	--
Meadow Creek area	4,000	Enlarge existing plant	--
Textile plant	Not known	New plant	--
One miscellaneous industry	Not known	Undetermined	--
Clifton Forge	6,900	New plant	--
Colonial Heights	6,900	New plant	Plans approved
Va. State College	1,600	New plant	Plans approved
Covington	6,800	New plant	Plans under preparation
Boys' Home	90	New plant	--
Paper products	200,000	New plant	--
Textile and chemical products plant	13,400	New plant	--
Crewe	3,000	New plant	Plans under preparation
Crozet:			
Montague estate	100	New plant	--
Food processing plant	Not known	New plant	--
Denhigh:			
Dairy products	Not known	New plant	--
Dairy products	Not known	New plant	--
Ettrick Sanitary District	1,370	New plant	--
Farmville	4,500	New plant	--
Industrial establishment	100***	New plant	--
Slaughterhouse	Not known	Undetermined	--
Slaughterhouse	Not known	New plant	--
Ferguson Park	3,500	Connect to Hampton Roads System	--
Fincastle School	625	New plant	--
Fork Union Military Academy	650	New plant	--
Fordwick:			
Industrial establishment	250***	Undetermined	--
Glasgow:			
Miscellaneous industry	Inorganic waste	New plant	--
Goshen:			
Miscellaneous industry	Inorganic waste	Undetermined	--
Greenlee:			
Miscellaneous industry	Inorganic waste	New plant	--
Hopewell	10,100	New plant	Plans under preparation
Industrial establishment	1,300***[a]	New plant	Final plans approved
Chemical industry	Not known	New plant	--
Textile plant	7,000	New plant	--
Paper industry	295,000	New plant	--

See footnotes at end of table.

Table I_3. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950--Continued

Name	Population served**	Project requirements	Remarks
VIRGINIA--Continued			
Huntington Heights	400	Connect to Hampton Roads System	--
Iron Gate	655	New plant	Plans under preparation
Leather products	Not known	New plant	Plans under preparation
Lexington	7,000	New plant	Plans under preparation
Lynchburg	49,000	New plant	--
State Colony	1,900	New plant	Under construction
Rendering plant	Not known	New plant	--
Paper and chemical products industry	191,000	New plant	--
Primary metal industry	Not known	Undetermined	--
Madison Heights	935	New plant	--
Abattoir plant	Not known	New plant	--
New Castle	800	New plant	--
Norfolk (Part I)	1,200	New plant	Plans under preparation
(Part 2)	1,200	New plant	Plans under preparation
Dairy plant	Not known	New plant	--
Norfolk, County of:			
Crestwood Subdivision	1,200	New plant	--
East Estabrook	400	New plant	--
Engleside Subdivision	400	New plant	--
Forhall Subdivision	240	New plant	--
Great Bridge School	250	Replace existing plant	--
Norview	1,500	New plant	--
Portlock Subdivision	500	New plant	--
West Estabrook	400	New plant	--
Petersburg	36,000	New plant	Plans under preparation
State Hospital	4,500	New plant	Plans under preparation
State Colony	325	New plant	--
Slaughterhouse	Not known	New plant	--
Dairy plant	Not known	New plant	--
Piney River:			
Chemical industry	Inorganic waste	New plant	--
Portsmouth:			
U. S. Naval Hospital	Not known	Connect to Portsmouth system	Plans under preparation
U. S. Naval Shipyard	Not known	Connect to Portsmouth system	Plans under preparation
Richmond	250,000	New plant	Plans under preparation
Industrial establishment	55***	New plant	Plans under preparation
Industrial establishment	100***	New plant	--
Quartermaster depot	Not known	New plant	--
Masonic home	200	New plant	--
Industrial establishment	5,000***	New plant	--
Chemical industry	50,000 plus inorganic waste	New plant	--
Chemical industry	Not known	New plant	--
Chemical industry	Not known	New plant	--
Paper industry	Not known	New plant	--
Paper industry	Not known	New plant	--
Paper industry	11,600	New plant	--
Fabricated metals industry	Not known	Undetermined	--
One miscellaneous industry	Not known	Undetermined	--

See footnotes at end of table.

Table I_3. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950--Continued

Name	Population served**	Project requirements	Remarks
VIRGINIA--Continued			
St. Emmas Institute	300	New plant	--
Schuyler:			
Miscellaneous industry	Inorganic waste	New plant	--
Scottsville	450	New plant	--
Selma	200	New plant	Final plans approved
State Industrial Farm for Women	270	New plant	Under construction
Smithfield:			
Meat products industry	70,000	New plant	--
Meat products industry	Not known	New plant	--
Meat packing plant	Not known	New plant	--
Meat packing plant	Not known	New plant	--
Meat processing plant	Not known	New plant	--
Meat processing plant	Not known	New plant	--
Suffolk	11,300	New plant	Plans under preparation
Slaughterhouse	Not known	New plant	--
Slaughterhouse	Not known	New plant	--
Slaughterhouse	Not known	New plant	--
Slaughterhouse	Not known	Undetermined	--
Dairy plant	Not known	New plant	--
Vegetable cannery	Not known	Undetermined	--
One miscellaneous industry	Not known	Undetermined	--
Troutville:			
Tomato cannery	Not known	New plant	--
Vanderpool:			
Chemical products	Not known	Undetermined	--
Virginia State Farm	400	New plant	--
Williamsburg	5,400	Enlarge existing plant	Under construction

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

***Sanitary sewage.

****Average figure, actual load varies. Discharge is from holding pond in accordance with river flow.

[a] Does not include industrial waste discharges of undetermined type and quantity.

CHOWAN RIVER SUB-BASIN

General Description

The Chowan River Sub-Basin is bounded on the north and east by the James River Sub-Basin, on the east by the North Carolina - Virginia Coast Sub-Basin, and on the southwest by the Roanoke River Sub-Basin. The main river is formed by the confluence of the Blackwater and Nottoway Rivers near the North Carolina-Virginia line and flows in a southerly direction to Albemarle Sound. A principal tributary, the Meherrin River also rises in southern Virginia. The sub-basin embraces a total drainage area of about 5,225 square miles of which 4,050 square miles are in Virginia and 1,175 are in North Carolina.

The Chowan River and its tributaries drain an area mainly in the Coastal Plain. At low stage, tidal effect is felt on the Blackwater River above Franklin, Va.

The climate of the sub-basin is classed as humid. The mean annual temperature is approximately 59° F. The average annual rainfall varies with location from about 44 inches to over 48 inches. A seven-year record at the U.S. Geological Survey gauge near Sebrell, Va. on the Nottoway River, where the drainage area is 1,451 square miles, indicates a maximum discharge of 25,000 cubic feet per second and a minimum of 12 cubic feet per second. A four-year record on the Blackwater River near Franklin, Va., where the drainage area is 613 square miles, indicates a maximum discharge of 5,360 cubic feet per second and a minimum of four tenths cubic foot per second. An 18-year record of the gauge near Lawrenceville, Va. on the Meherrin River, where the drainage area is 553 square miles, indicates an average cubic foot per second discharge of 504, a maximum of 38,000, and a minimum of five.

The population of the Chowan River Sub-Basin was 210,474 based on the 1940 census. The preliminary 1950 census indicates the population to be 222,259.

Economic Development

There were five urban communities in the sub-basin in 1950 comprising ten percent of the population. Three of these are in Virginia.

The chief economic activities of the sub-basin are farming and commercial fishing. The farming is diversified; the chief crops being tobacco, cotton, peanuts, corn, potatoes, grains and truck crops. In 1945 two counties in the sub-basin were among the leading tobacco producers in the United States; and several were among the leading peanut producing counties.

The industrial developments in the area are few in number. Those in North Carolina are negligible. In Virginia there is diversified small scale manufacturing of paper and pulp products. Lumber and wood products are the most important.

Use of Water Resources

There are 29 public water supplies located in the sub-basin which serve a total population of 46,890. Of these only three, serving 8,100 people, are from surface sources.

The lower reach of the Chowan River is used for bathing, sailing and sport fishing. The commercial fishery is of considerable value there, especially during the spring herring run.

The Chowan River is navigable for a distance of 50 miles, with a controlled depth of 12 feet to the mouth of the Meherrin River and nine feet to the Virginia-North Carolina State line. The Meherrin River is navigable, with a depth of ten feet and channel width of 100 feet to Murfreesboro, N. C. about 12 miles above its mouth.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_4 through I_4 inclusive.

There are 26 sources of municipal pollution in the sub-basin. Twenty of these sources have a contributory population of 28,250 and discharge wastes to the streams having a population equivalent of 24,300. The pollution load from the six other communities with a sewered population of more than 4,300 is not known.

Ten industries contribute significant amounts of wastes directly to the streams of this sub-basin. All produce wastes which are organic in character and the population equivalent of the wastes from two of these industries is 37,950. In addition, one of these industries produces inorganic wastes.

Sewage treatment in this sub-basin is carried out at five secondary sewage treatment plants serving four communities with a connected population of more than 1,625 and one military installation. In addition, 18 primary treatment plants serve 15 communities with a connected population of about 13,180. No treatment is provided for the wastes from six other municipalities.

Two of the industries producing significant quantities of wastes have treatment facilities, seven have none, and facilities at one are undetermined.

On the basis of design capacity 16 of the 23 municipal treatment plants are adequate, and seven are unsatisfactory. Thirteen of these plants are operated satisfactorily, five unsatisfactorily, and the adequacy of operation of five others has not been determined.

Adequacy as to capacity and operation is undetermined for the two industrial waste treatment facilities.

During the period 1946-1949 two new municipal waste treatment plants to serve a population of 1,300 were completed. No industrial waste treatment plants were constructed.

Seven new municipal plants to serve a population of 15,200, three new industrial waste treatment plants, and eight additions or enlargements to existing municipal plants serving 8,050 people are needed to abate pollution in the sub-basin. No projects are required at 15 communities having a sewered population of 9,345. Needs at five industries remain undetermined.

Table A_4. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	20	28,252	24,282
Having population data available (Data on pollution load to watercourse incomplete or not available)	*** 6	4,340	Not applicable
Total	26	32,592	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes Camp Pickett, U.S. Army installation, and one mill village for which no population served or pollution discharged figures are available.

No formal action has been taken by 14 municipalities to abate pollution. Final plans for abatement have been approved at one municipality. The status at eight industries is undetermined.

Table B_4. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	2	37,940
Producing organic wastes	8	Undetermined
Producing inorganic wastes	**1	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***10	—

*Industries having separate outlets and discharging wastes directly to watercourse.

**Included also under organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_4. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	**15	18	13,185
Secondary	***5	5	1,625
No treatment	6	—	17,782

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one mill village for which no population served figure is available.

***Includes Camp Pickett, U.S. Army installation, for which no population served figure is available.

Table D_4. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	7	1	5	1
Textile mill products......	1	0	1	0
Paper and allied products..	2	1	1	0
Chemical and allied products.................	**1	**1	0	0
Total.................	***10	***2	7	1

*Industries having separate outlets and discharging wastes directly to watercourse.
**Included also under paper and allied products.
***Total adjusted to correct for duplication noted in footnote above.

Table E_4. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	23	16	7	0	13	5	5
Industrial	2	—	—	2	—	—	2

Table F_4. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	*2	1,300	0	—

*Includes enlargement of one plant serving a population of 300.

Table G4. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**7	15,197	3
Enlargement or additions to existing plant	***8	8,050	--
Replace existing plant	--	--	--
No project required	****15	9,345	2
Undetermined	0	--	5

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes two new plants at each of two municipalities. Due to local conditions one of these municipalities with two plants classified as unsatisfactory in capacity, has been considered as requiring new plants rather than replacements.

***Includes two additions at two municipalities. Three plants now satisfactory as to adequacy, require additions in order to provide for a higher degree of treatment in the future.

****Includes two municipal sources of pollution for which no population served figures are available, and two municipalities without treatment that have been considered as requiring no project at the present time.

Table H4. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	14	--
Abatement ordered	0	--
Plans under preparation	0	--
Final plans approved	1	--
Construction awaiting financing	0	--
Under construction	0	--
Status undetermined	0	8

Table I_4. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Ahoskie	2,300	Addition to two plants	—
Aulander	550	Addition to plant	—
Colerain:			
Fish canning plant	Not known	Two undetermined	—
Edenton:			
Fish canning plants	Not known	Two new plants	—
VIRGINIA			
Blackstone:			
Slaughterhouse	Not known	Undetermined	—
Boykins	800	Addition to plant	—
Emporia	5,500	New plant	—
Textile plant	Not known	New plant	—
Franklin	5,000	New plant	Final plans approved
Paper products	37,000	Undetermined	—
Kenbridge	1,000	Addition to plant	—
Lawrenceville #1	1,700	New plant	—
#2	800	New plant	—
St. Paul's Polytechnical Institute	882	New plant	—
McKenney	800	Additions to plant	—
South Hill #1	265	New plant	—
#2	1,150	New plant	—
Stony Creek:			
Slaughterhouse	Not known	Undetermined	—
Victoria #1	800	Addition to plant	—
#2	800	Addition to plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

ROANOKE RIVER SUB-BASIN

General Description

The Roanoke River Sub-Basin is bounded on the north and northeast by the James and Chowan River Sub-Basins; on the southeast by the North Carolina-Virginia Coast Sub-Basin; on the south by the Tar, Neuse, Cape Fear and Yadkin-Pee Dee River Sub-Basins; and on the west by the Kanawha River Sub-Basin.

The Roanoke River rises in the Great Valley of Virginia. It flows southeasterly across the Piedmont Plateau entering North Carolina just above the town of Roanoke Rapids 240 miles from its source. In North Carolina it continues a southeasterly course for 160 miles to empty into Batchelor's Bay, an arm of Albemarle Sound. Its drainage area is approximately 9, 630 square miles, of which about 6, 300 are in Virginia and 3, 330 are in North Carolina.

The principal tributary of the Roanoke River is the Dan River which arises in western Virginia and crosses the North Carolina-Virginia State line four times before joining the Roanoke near Clarksville, Va. The Dan River is 210 miles long and drains an area of 2, 850 square miles.

The mean annual temperature varies from approximately 59° F. near the coast to 56° F. at Roanoke, Va. The average annual rainfall varies from 40 inches in the western part of the sub-basin to 44 inches near the coast. Rainfall is fairly well distributed throughout the year. A 35-year record of the U. S. Geological Survey gauge at Roanoke Rapids, N. C., where the drainage area is 8, 410 square miles, shows the average discharge in cubic feet per second to be 8, 326, the maximum to be 261, 000, and the minimum regulated flow to be 458.

The population of the sub-basin, based on the 1940 census, was 637, 737. The preliminary 1950 census indicates the population to be 684, 834.

Economic Development

There are 15 urban communities in the sub-basin and part of a sixteenth which together constitute 29 percent of the total population. These communities are evenly divided between North Carolina and Virginia. Roanoke and Danville, both in Virginia, have populations in excess of 30, 000.

The sub-basin is primarily agricultural, although industry is of importance. The principal farm crops are tobacco, cotton, corn, peanuts, potatoes, grains, fruits and vegetables. In 1945 several counties were among those in the nation leading in tobacco production, four were in the first hundred in apple production, and one each held this rank in peach, fresh bean, and tomato production.

The sub-basin contains several cities which are important textile milling and processing centers. Other industries of importance are tobacco and food processing, and pulp and paper milling. Roanoke and Danville, Va. are extensively diversified industrial centers.

The lower reaches of the Roanoke River below Roanoke Rapids, N. C., provide a valuable commercial fishery.

Use of Water Resources

There are 63 public water supplies in the sub-basin serving 202, 975 people. Twenty-five of these take all or part of their supply from surface sources and service a population of 165, 105.

The only conspicuous recreational facilities offered in the sub-basin are the boating, bathing, fishing, and camping in the lower coastal areas. This area also is attractive to large numbers of wild ducks and geese during the winter months.

The spring runs of herring, shad, and rockfish support commercial fishing in the lower part of the river.

Navigation is possible on the river by a project depth of ten feet to Hamilton, 62 miles above its mouth, and five feet to Weldon.

Several privately owned hydroelectric developments exist in the sub-basin. The Federal government now has under construction dams for power and flood control at Buggs Island on the Roanoke River and on the Smith River at Philpott, both in Virginia.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_5 through I_5 , inclusive.

There are 52 sewered municipalities in the sub-basin, 49 of which have a total sewered population of 203, 845 persons. Forty-seven of these municipalities with a combined population of 202, 675 discharge waste with a population equivalent of 193, 076. Of these 52 municipalities, 15 have 16 primary treatment plants, ten[2] provide secondary treatment, and 28 have no treatment facilities.

There are 42 industries discharging waste directly to streams. Five produce organic waste with a population equivalent of 136,750. Thirty-four others produce organic waste of undetermined strength. Three (including one also producing organic waste) produce inorganic waste. One produces waste of undetermined type. Of these, eight have treatment plants.

Twenty of the municipal waste treatment plants are adequate on the basis of design capacity, three are unsatisfactory and three others are undetermined. The operation of 13 of these plants is considered satisfactory, that at five unsatisfactory, and that at eight is undetermined

Six of the eight industrial waste treatment plants are satisfactory with respect to capacity and operation. The data pertaining to the remaining two is undetermined.

A single new municiapl treatment plant was constructed during the period 1946-1949 to serve 2,500 persons. Twenty-eight new plants[3] to serve a population of over 166,274, enlargements at three plants serving 1,800 people, and 19 new industrial waste treatment plants are needed to abate pollution in the sub-basin. The requirements at one municipality serving 1,800 persons, and 15 industries are undetermined.

Plans are under preparation for the construction of eight municipal plants, and one industrial plant. No formal action has been taken with respect to 23 municipal and 18 industrial waste treatment plants. The status at one municipality and 15 industries is undetermined.

Table A_5. Sources of pollution, municipal

Municipal-ities*	Sources of pollution (in number of munici-palities)	Population served by sewerage system	Amount of pollution discharged to water-course (in terms of equivalent number of people)**
Having data on pollution load dis-charged to watercourse	47	202,675	193,076
Having population data available (Data on pollution load to watercourse incomplete or not available)	2	1,090	Not applicable
Total	***52	203,765	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes three municipalities for which no population served or pollution discharged figures are available.

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[2] Includes one also listed with those having primary treatment.

[3] Population served figure for one municipality is not available.

Table B5. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	5	136,750
Producing organic wastes	34	Undetermined
Producing inorganic wastes	**3	Not applicable
Producing wastes of undetermined type	1	Undetermined
Total	***42	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes one plant also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote above.

Table C5. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	**15	16	19,204
Secondary	***10	10	11,490
No treatment	****28	—	173,071

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two municipalities for which no population served figures are available.

***Includes one municipality also listed under primary treatment.

****Includes two municipalities for which no population served figures are available.

Table D5. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	23	1	22	0
Textile mill products......	15	6	9	0
Paper and allied products..	1	0	1	0
Chemical and allied products................	**2	1	**1	0
Fabricated metal products..	1	0	1	0
Miscellaneous.............	1	0	1	0
Total..................	***42	8	***34	0

*Industries having separate outlets and discharging wastes directly to watercourse.
**Includes one plant also listed under textile mill products.
***Totals adjusted to correct for duplication noted in footnote above.

Table E5. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	26	20	3	3	13	5	8
Industrial	8	6	--	2	6	--	2

Table F_5. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	1	2,500	0	--

Table G_5. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**28	166,274	19
Enlargement or additions to existing plant	***3	1,800	--
Replace existing plant	--	--	--
No project required	****22	33,891	8[1]
Undetermined	1	1,800	15

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in changes to these needs.

**Includes two municipalities for which no population served figure is available. Due to local conditions two municipalities with plants classified as unsatisfactory and one as undetermined have been considered as requiring new plants rather than replacements.

***Includes two plants at one municipality, now satisfactory as to adequacy, requiring additions in order to provide for a higher degree of treatment.

****Includes one municipality for which no population served figure is available. Due to local conditions, three municipalities without treatment have been considered as requiring no project at the present time. Two municipalities with plants classified as undetermined in table E_5 are considered to require no project.

[1] Includes one industry having waste treatment facilities undetermined as to adequacy of capacity.

Table H_5. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	23	18
Abatement ordered	--	--
Plans under preparation	8	1
Final plans approved	1	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	1	15

Table I5. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Draper	3,573	New plant	Plans under preparation
Textile mill	5,000	New plant	Plans under preparation
Leaksville	1,360	New plant	Plans under preparation
Madison	1,000	New plant	—
Mayodan	1,300	Enlargement and addition to plant	—
Plymouth	1,800	Undetermined	—
Paper mill	96,000	Undetermined	—
Roanoke Rapids	3,545	New plant	—
Spray Sanitary District	Not known	New plant	Plans under preparation
Textile mills	21,000	New plant	—
Stoveville	500	Enlarge 2 plants	—
Walnut Cove	500	New plant	—
Windsor	1,600	New plant	—
VIRGINIA			
Altavista	4,000	New plant	—
Industrial establishment	1,000***	New plant	—
Textile plant	750	New plant	—
Bedford	3,650	New plant	Plans under preparation
Industrial establishment	Not known	New plant	—
Tomato cannery	Not known	Undetermined	—
Slaughterhouse	Not known	New plant	—
Slaughterhouse	Not known	New plant	—
Brookneal	600	New plant	—
Chatham	1,800	New plant	—
Clarksville	900	New plant	—
Slaughterhouse	Not known	Undetermined	—
Danville	40,000	New plant	—
Industrial establishment	7,500***	New plant	—
Textile mill	14,000	New plant	—
Slaughterhouse	Not known	New plant	—
Meat products	Not known	New plant	—
Meat products	Not known	New plant	—
Miscellaneous industry	Not known	New plant	—
Elliston:			
Slaughterhouse	Not known	New plant	—
Ferrum Junior College	200	New plant	—
Fieldale:			
Textile products	Not known	New plant	—
Goodes:			
Slaughterhouse	Not known	Undetermined	—
Halifax:			
Textile products	Not known	Undetermined	—
Ironto:			
Food cannery	Not known	Undetermined	—
Lowery:			
Tomato cannery	Not known	Undetermined	—
Manchester Court Subdivision	100	New plant	—
Martinsville	12,000	New plant	Plans under preparation
Slaughterhouse	Not known	New plant	—
Textile products	Not known	New plant	—
Moneta:			
Tomato cannery	Not known	Undetermined	—

See footnotes at end of table.

Table I5. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950--Continued

Name	Population served**	Project requirements	Remarks
VIRGINIA--Continued			
Food products	Not known	Undetermined	--
Orchard Heights and Court Subdivisions	125	New plant	--
Roanoke	62,000	New plant	Plans under preparation
Textile and chemical products	Not known	New plant	--
Rocky Mount	1,566	New plant	--
Slaughterhouse	Not known	New plant	--
Salem	6,500	New plant	Plans under preparation
Tannery	Not known	Undetermined	--
Fabricated metal products	--	New plant	Inorganic waste. Plans under preparation
South Boston	1,200	New plant	--
Slaughterhouse	Not known	New plant	--
Textile products	800	New plant	--
South Hill	880	New plant	--
South Salem	1,200	New plant	--
Stuart	775	New plant	--
Food products	Not known	Undetermined	--
Thaxton:			
Tomato cannery	Not known	Undetermined	--
Tomato cannery	Not known	Undetermined	--
Tomato cannery	Not known	Undetermined	--
Tomato cannery	Not known	Undetermined	--
Vinton	3,700	New plant	Plans under preparation

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

***Sanitary sewage.

TAR RIVER SUB-BASIN

General Description

The Tar River Sub-Basin is bounded on the north by the Roanoke River Sub-Basin, on the east by the North Carolina-Virginia Coast Sub-Basin, and on the southwest by the Neuse and Cape Fear River Sub-Basins. The sub-basin, which lies entirely within the State of North Carolina, covers about 4,200 square miles. The drainage area includes that of the Tar River proper and the estuary which is known as the Pamlico River.

The Tar River rises in the Piedmont Plateau and flows in a general southeasterly direction across the Coastal Plain to Pamlico Sound. The sub-basin has a straightline length of about 160 miles and an average width of 30 miles. The river itself is 180 miles long from the headwaters to a point 40 miles above Pamlico Sound, where it becomes the Pamlico River.

The mean annual temperature varies from 59° F. in the northwest end of the sub-basin to 61° F. in the southeastern portion. Rainfall averages from 43 inches to 49 inches annually depending upon the location. A 20-year record at the U.S. Geological Survey gauge at Tarboro, where the drainage area is 2,100 square miles, indicates the average rate of flow in cubic feet per second to be 2,283, the maximum rate of flow to be 37,200, and the minimum to be 36.

The population of the sub-basin was 280,851 based on the 1940 census. The preliminary 1950 census indicates that the population has increased to 299,027.

Economic Development

There are nine urban communities in the sub-basin whose population comprises 28 percent of the total. The principal cities are Rocky Mount and Greenville. These and others are trading centers for tobacco and other farm products. Washington, at the head of Pamlico River, is also a distribution center for water-borne commerce and products of the fishing industry.

Industry in the area is of relatively little importance. The largest tobacco market in the State, however, is at Rocky Mount which also has the Atlantic Coast Line Railroad shops. There are several small textile plants, a meat packing plant, and a number of sawmills.

Agriculture is the principal occupation of the people of the sub-basin. The chief crops are tobacco, cotton, corn, peanuts, potatoes, soy beans, and truck produce. A considerable trade is carried on in livestock, particularly in horses and mules.

Use of Water Resources

There are 20 public water supplies in the sub-basin serving a total population of 103,470. Eight of these supplies are from surface sources which supply water for 73,700 persons.

Very little has been done in this sub-basin toward the utilization of water resources for recreational purposes, and no areas have been proposed for development. In the Pamlico River near Washington, there is considerable fishing and boating.

Commercial fishing in the lower reaches of the river is quite extensive. This includes herring and shad fishing during the spring spawning season as far up stream as Rocky Mount.

Navigation is provided for by a 9.6 foot channel from the mouth of the river to Washington, and a 3.5 foot channel thence to a point eleven miles below Greenville.

There are no hydroelectric developments of any size on the Tar River.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_6 through I_6, inclusive.

Nineteen municipalities with a total sewered population of 65,670 discharge to the streams of this sub-basin wastes with a population equivalent of about 39,400. No additional pollution is added to these streams by separate industrial waste outlets.

Sewage treatment is provided by two secondary treatment plants serving 26,200 persons and 21 primary treatment plants serving 16,570 persons residing in 13 municipalities. Untreated sewage is discharged to the streams from four municipalities having a connected population of 22,900.

On the basis of design capacity, only five of the 23 municipal waste treatment plants are considered to be adequate and the remaining 18 are unsatisfactory. The operation of six of these plants is considered to be satisfactory and 17 unsatisfactory.

Two municipal waste treatment plants now serving a total of 600 persons were constructed during the period 1946-1949. The projects required to abate pollution in this sub-basin are as follows: 12 new municipal plants to serve 15,650 persons, the replacement of seven existing plants to serve 9,500 persons and the enlargement of one plant to serve 1,200 persons. Six municipalities with a connected population of 30,320 require no projects and the requirements at one municipality with a connected population of 9,000 are undetermined.

Plans for pollution abatement are under preparation for one municipality and another municipality has received abatement orders. No formal abatement action has been taken by 19 municipalities.

Table A_6. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	19	65,670	39,420
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	Not applicable
Total	19	65,670	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_6. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	0	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_6. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	21	16,570
Secondary	2	2	26,200
No treatment	4	--	22,900

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_6. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having: Treatment facilities	No treatment facilities	Undetermined facilities
—	0	—	—	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_6. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to: Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	23	5	18	0	6	17	0
Industrial	0	—	—	—	—	—	—

Table F_6. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	1	100	0	—
1948	0	—	0	—
1949	1	500	0	—

Table G_6. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**12	15,650	0
Enlargement or additions to existing plant	1	1,200	0
Replace existing plant	7	9,500	0
No project required	***6	30,320	0
Undetermined	1	9,000	0

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions seven municipalities having a total of nine primary treatment plants classified as unsatisfactory in capacity, have been considered as requiring new plants rather than replacements.

***Includes one municipality without treatment not considered to require a project at the present time.

Table H_6. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	19	0
Abatement ordered	1	0
Plans under preparation	1	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

Table I_6. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served	Project requirements	Remarks
NORTH CAROLINA			
Bethel........................	1,200	Enlarge existing plant	—
Elm City......................	850	New plant	—
Enfield.......................	1,550	Two new plants	—
Franklinton...................	750	Replace existing plant	—
Greenville....................	9,000	Undetermined	—
Littleton.....................	1,000	Replace 4 existing plants	—
Louisburg.....................	2,000	New plant	—
Nashville.....................	1,000	Replace 2 existing plants	—
Pinetops......................	1,000	New plant	—
Robersonville.................	1,000	New plant	—
Scotland Neck.................	2,000	New plant	—
Spring Hope...................	1,000	Two new plants	Abatement ordered
Tarboro.......................	7,000	New plant	Plans under preparation
Washington....................	6,000	New plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in changes to these needs.

NEUSE RIVER SUB-BASIN

General Description

The Neuse River Sub-Basin is bounded on the northeast by the Tar River Sub-Basin, on the southeast by the North Carolina-Virginia Coast Sub-Basin, on the southwest by the Cape Fear River Sub-Basin, and on the northwest by the Roanoke River Sub-Basin. The river is formed by the confluence of the Eno and Flat Rivers in the eastern Piedmont region of northcentral North Carolina and flows across the Coastal Plain to Pamlico Sound. Its length, including the Flat River, is about 300 miles. The total drainage area of the sub-basin is about 5,640 square miles, all of which lies in the State of North Carolina.

The mean annual temperature ranges from 63° F. on the coast to 59° F. inland. The average annual rainfall varies from approximately 37 inches at Durham, N.C. to nearly 56 inches near the coast. A 17-year record at the U.S. Geological Survey gauge at Kingston, N.C., where the drainage area is 2,690 square miles, shows the average discharge in cubic feet per second to be 2,856, the maximum to be 25,900, and the minimum to be 124.

The population of the sub-basin according to the 1940 census was 466,777. The preliminary 1950 census indicates the population to be 539,858.

Economic Development

There are nine communities and part of another in the sub-basin whose combined populations comprise 36 percent of the total. The largest of these is Durham with a population of 70,307, but which lies half in the Cape Fear River Sub-Basin. Raleigh, a city of 65,123, is the State capitol. Four other cities have populations of between 15,000 and 25,000.

The principal activity of the sub-basin is agriculture. The land is well adapted to growing a variety of crops, chief among which are tobacco, cotton, peanuts, potatoes, corn, and truck produce.

The principal industrial area is at Durham, where the chief activities are the manufacture of cigarettes and other tobacco products and textiles.

Use of Water Resources

There are 37 public water supplies in the sub-basin serving 216,535 people. Ten of these serving a population of 149,700 are from surface sources.

Other than for public water and livestock water supplies, the principal water use in the sub-basin is for recreation. Many private lakes exist in the upper part of the sub-basin. Two State parks have been developed for outdoor activities including fishing, hunting, boating and camping. These sports are also engaged in throughout the sub-basin.

There is considerable commercial fishing in the lower reaches of the river.

The Neuse is navigable by 11.5-foot channel to New Bern, and for 23 miles farther by a 3.8-foot channel.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_7 through L_7, inclusive.

There are 39 sources of municipal pollution in the sub-basin. Thirty-seven have a combined sewered population of 184,950 and discharge waste with a population equivalent of 162,145. One municipality with a sewered population of 100 has no data on the pollution load to a watercourse, and population and other data is lacking for one military base. The two industries in the sub-basin produce organic waste with a population equivalent of 7,500.

Sewage treatment is provided by secondary treatment plants at 12 municipalities, 11 of which have a sewered population of 58,485, and seventeen primary plants serving sixteen municipalities having a sewered population of 14,500. 112,050 persons residing in eleven municipalities are not served by treatment facilities for their wastes.

One of the two industries contributing organic waste to the streams has treatment facilities.

On the basis of design capacity 26 of the 29 existing municipal waste treatment plants are considered adequate and the remaining three unsatisfactory. The operation of 25 plants is considered to be satisfactory and of four unsatisfactory. The industrial waste treatment plant is satisfactory both as to design capacity and operation under present conditions.

Four new municipal treatment plants designed to serve 2,600 persons were constructed in 1949. Six new plants to serve 72,100 persons and enlargements or additions at three to serve 35,700 persons, are required to abate pollution in the sub-basin. Project requirements at one municipality are undetermined. Two new industrial waste treatment plants are also needed.

No formal action to abate pollution has been taken with seven municipalities and two industries. Abatement has been ordered at three communities.

Table A_7. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	37	184,950	162,145
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	100	Not applicable
Total	***39	185,050	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one source of pollution, consisting of the Cherry Point Marine Base, for which no population served or pollution discharged figures are available.

Table B_7. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	2	7,500
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	2	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_7. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	16	17	14,515
Secondary	**12	**12	58,485
No treatment	11	--	112,050

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes Cherry Point Marine Base for which population served datum is not given.

Table D_7. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products................	1	0	1	0
Textile mill products.....	1	1	0	0
Total.................	2	1	1	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_7. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	29	26	3	0	25	4	0
Industrial	1	1	0	0	1	0	0

Table F_7. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	4	2,600	0	--

Table G_7. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	6	72,100	**2
Enlargement or additions to existing plant	3	35,700	0
Replace existing plant	0	--	0
No project required	30***	68,750	0
Undetermined	1	8,500	0

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**One industrial waste treatment plant now adequate on the basis of design capacity requires an entirely new plant in order to provide for a higher degree of treatment.

***Includes Cherry Point Marine Base, for which no population served figures are available. Four municipalities without treatment facilities are classified as requiring no project at the present time, since the disposal of their wastes is considered satisfactory.

Table H_7. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	7	2
Abatement ordered	3	0
Plans under preparation	0	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

Table I7. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Ayden	1,500	New plant	--
Benson	1,600	Enlarge existing plant	--
Clayton	1,400	New plant	--
Durham	32,000	Enlarge existing plant	--
New Bern	8,500	Undetermined	--
Raleigh #1	34,000	New plant	--
#2	30,000	New plant	--
Selma	2,100	Addition to plant	--
Smithfield	1,800	New plant	--
Meat packing plant	5,000	New plant	--
Wake Forest	3,400	New plant	--
Textile mill	2,500	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

NORTH CAROLINA-VIRGINIA COAST SUB-BASIN

General Description

The North Carolina-Virginia Coast Sub-Basin includes a strip of lowlands extending along the Atlantic Coast from the Virginia-Maryland State line southward nearly to Wilmington, N. C. It includes the Eastern Shore of Virginia and small areas along the western shore of Chesapeake Bay. It is characterized by coastal plains which lie slightly above sea level, swamps, and the numerous sounds and banks of the North Carolina coast. The area is drained by numerous minor coastal streams, but its western margin is broken by the estuaries of the Rappahannock, York, James, Chowan, Roanoke, Tar and Neuse Rivers. The total drainage area of the sub-basin is 5,956 square miles, 4,729 of which lie in North Carolina and the remainder in Virginia.

The climate of the area is considerably warmer than is found inland due, largely, to the proximity to the Gulf Stream which is 12 to 40 miles off shore depending upon the latitude. The mean annual temperature varies from 60°F. on the Eastern Shore of Virginia to 62° F, toward the southern end of the area. The average annual rainfall varies from 43 inches to 47 inches.

The population of the sub-basin was 230,789 based on the 1940 census. The preliminary 1950 census indicates that the population has increased to 323,806.

Economic Development

There are six urban communities in the sub-basin whose combined population is ten percent of the total. Besides these there are numerous small fishing villages, agricultural centers and summer resorts.

The chief economic activities of the sub-basin are fishing and shellfishing, packing of fish and other sea foods, farming, and the maintenance of summer and winter resorts. Principal crops are truck, produce, peanuts, corn, and in some areas tobacco, cotton, and grains. Canneries located on the Eastern Shore of Virginia handle a large part of the truck crops produced in that area.

Shipping is of importance at Morehead City, N. C. accessable by means of a 30-foot channel. The Intracoastal Waterway also traverses the entire area.

Use of Water Resources

There are 15 public water supplies in the area serving 53,683 people. All of these supplies are from underground sources.

The principal use of the water resources is for commercial fishing. Valuable food fish, oyster and shrimp fisheries are found throughout the entire area. In addition, the recreational activities afforded by the coastal waters contribute in a large measure to the economic life of the region. These activities include sport fishing, hunting, boating, and swimming.

The waters of the sounds and coastal streams constitute one of the important overwintering areas of the Atlantic Coast for wild water fowl.

The Intracoastal Waterway, which traverses the entire area, carries a considerable amount of commercial traffic as well as numerous pleasure craft.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_8 through I_8, inclusive.

There are 18 municipalities in the sub-basin discharging pollution to watercourses. Fourteen of these, with a connected population of 32,000, produce sewage having a population equivalent of 27,755. One with a connected population of 15,000 lacks data concerning the strength of the sewage effluent. Three others are military establishments for which population figures are not available. In addition, 15 industries in the sub-basin contribute organic waste of an undetermined strength directly to streams.

Five[4] municipalities have seven primary treatment plants which serve more than 4,010 people. Four[5] municipalities have secondary treatment plants serving a population greater than 19,100. Nine municipalities having a sewered population of 23,890 provide no treatment. Of the industries discharging waste directly to watercourses, seven provide treatment, seven have no treatment facilities, and the facilities of one are undetermined.

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[4] Two are military establishments for which population served data are not available.

[5] Includes a military establishment for which population served data are not available.

Of the eleven existing municipal treatment facilities, the design capacity of three is satisfactory, that of three is unsatisfactory, and that of five is undetermined. In regard to operation four are satisfactory and the status of seven is undetermined. The design capacity of five of the industrial waste treatment plants is satisfactory, that of one unsatisfactory, and of the other undetermined. Operation at six is satisfactory and that of the other is undetermined.

No waste treatment plants were built in the sub-basin during the period 1946-1949.

To abate pollution in the sub-basin five new municipal plants to serve 10,670 people, additions to two plants serving in excess of 3,500 people, and replacement of two existing plants serving 750 persons are known to be needed. Four new industrial waste treatment plants and enlargement of one other are required.

No formal action to abate pollution has been taken with six municipalities. Construction is awaiting financing at one other. Status of treatment works projects to abate pollution is undetermined for nine municipalities and nine industries.

Table A$_8$. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	14	32,000	27,755
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	15,000	Not applicable
Total	***18	47,000	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes three sources of pollution, U.S. military installations, for which no population served or pollution discharged figures are available.

Table B$_8$. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	15	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	15	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C$_8$. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	**5	7	4,010
Secondary	***4	4	19,100
No treatment	9	--	23,890

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two U.S. military installations for which no population served figures are available.

***Includes one U.S. military installation for which no population served figure is available.

Table D_8. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products................	10	2	7	1
Chemical and allied products................	5	5	0	0
Total.................	15	7	7	1

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_8. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	11	3	3	5	4	--	7
Industrial	7	5	1	1	6	--	1

Table F_8. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_8. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	5	10,670	4
Enlargement or additions to existing plant	**2	3,500	1
Replace existing plant	2	750	--
No project required	***4	5,280	6
Undetermined	****7	26,800	4

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**One U.S. military installation for which no population served figure is available, with a plant now satisfactory as to adequacy, is included because of foreseeable overloading in the near future.

***Two municipalities without treatment facilities are classified as requiring no project since the disposal of their wastes is considered satisfactory at the present time.

****Includes two U.S. military installations for which no population figures are available. One installation has three separate primary treatment outfalls. Also includes one municipality with no treatment.

Table H_8. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	6	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	1	--
Under construction	--	--
Status undetermined	9	9

Table I8. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Beaufort	3,270	New plant	—
Camp Lejeune Marine Base	Not known	Addition to existing plant	—
Elizabeth City	11,000	Undetermined	—
Hertford	1,700	New plant	—
Holly Ridge	600	Replace existing plant	—
Morehead City	2,600	New plant	—
Swansboro	400	New plant	Construction awaiting financing
Wrightsville Beach	3,500	Addition to existing plant	—
VIRGINIA			
Bridgetown:			
Slaughterhouse	Not known	New plant	—
Cape Charles	2,700	New plant	—
Cheriton:			
Cannery	Not known	Enlarge existing plant	—
Dam Neck (Military installation)	Not known	Three undetermined	—
Deltaville:			
Cannery	Not known	Undetermined	—
Exmore:			
Frozen food plant	Not known	Undetermined	—
Hallwood:			
Cannery	Not known	Undetermined	—
Little Creek:			
USN Amphibious Base	Not known	Undetermined	—
Machipongo:			
Cannery	Not known	New plant	—
Mathews:			
Dairy	Not known	Undetermined	—
New Church:			
Cannery	Not known	New plant	—
Northampton:			
Accomac Hospital	150	Replace existing plant	—
Onancock	800	Undetermined	—
Reedville:			
Cannery	Not known	New plant	—
Virginia Beach	15,000	Undetermined	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

CAPE FEAR RIVER SUB-BASIN

General Description

The Cape Fear River Sub-Basin is bounded on the north by the Roanoke River Sub-Basin, on the northeast by the Neuse River Sub-Basin, on the east by the North Carolina–Virginia Coast Sub-Basin and the Atlantic Ocean, and on the southwest by the Pee Dee and Yadkin-Pee Dee River Sub-Basins.

The Cape Fear River is formed by the confluence of the Haw and Deep Rivers in Chatham County, North Carolina. It flows in a generally southeasterly direction across the fall line of the Piedmont Plateau and Coastal Plain to discharge to the Atlantic Ocean at Cape Fear. Its length from the confluence of the Haw and Deep Rivers to the mouth is about 200 miles. The sub-basin lies entirely within the State of North Carolina and comprises approximately 8,500 square miles.

The largest tributary of the main river is the Northeast Cape Fear River which is 118 miles long and drains 1,710 square miles of the Coastal Plain. Other important tributaries are the Haw River with a drainage area of 1,760 square miles, and the Deep River with a drainage area of 1,390 square miles. The gradient of both of these latter streams is steep, the Haw falling 842 feet in 130 miles and the Deep falling the same amount in 120 miles.

The mean annual temperature at the northwest end of the sub-basin is about 58° F. Toward the coast it is 63° F. The average annual rainfall varies from forty-four inches inland to 47 inches near the coast. A 23-year record of the U.S. Geological Survey gauge at Lillington, where the watershed area is 3,440 square miles, indicates an average discharge in cubic feet per second of 3,309, a maximum discharge of 192,000, and a minimum regulated discharge of 29.

The population of the sub-basin was 676,388 based on the 1940 census. The preliminary 1950 census gives a population of 805,233.

Economic Development

There are 12 urban communities entirely within the sub-basin and three others located partly in it. The urban population residing in the sub-basin constitutes 37 percent of the total. Six of these cities have populations of approximately 25,000 or over. Two of these have populations greater than 70,000.

Industrial development in the sub-basin is more or less localized in the Haw and Deep River valleys. Numerous textile mills are located there, especially around Greensboro. High Point, which is partly in the Yadkin-Pee Dee River Sub-Basin, has one of the largest concentrations of furniture manufacturing in the United States. The processing of tobacco products is also important in the sub-basin. Wilmington, near the mouth of the Cape Fear River, is the largest port in the State.

The main Cape Fear River valley is preponderantly agricultural. The principal crop is cotton, and the others include tobacco, corn, peanuts, soy beans, fruit, berries and truck crops. Peaches are an important product of the Sand Hill Region. Fayetteville is a large trading center for agricultural products.

Use of Water Resources

There are 36 public water supplies in the sub-basin serving a population of 338,145. Seventeen of these are from surface sources and serve 300,560 people.

There are no hydroelectric power developments of large size in the sub-basin, although there are a number of small power dams. In the upper and central part of the sub-basin several reservoirs have been developed as recreational centers.

The largest beach and seaside resorts in the State are found near Wilmington.

Commercial fishing, particularly for shad, herring, and sturgeon, is quite extensively done in the river below Fayetteville.

The river is navigable by a 29-foot channel to Wilmington and further development of port facilities there are planned. A seven-foot channel is maintained by a series of three locks to Fayetteville 140 miles above the mouth. The Northeast Cape Fear River is navigable for 48 miles through a six-foot channel. The Black River is navigable for 24 miles by means of a five-foot channel.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_9 through I_9, inclusive.

There are 43 sources of municipal pollution in the sub-basin from a sewered population of 319,845. This pollution is reduced by treatment to a population equivalent of 235,430. Twelve industries discharge organic pollution, having a population equivalent of 20,100, directly to streams. Three others, including one of the above mentioned 12, discharge inorganic waste.

Twenty-one municipalities have 24 primary treatment plants serving a population of 28,180. Eleven municipalities have 14 secondary treatment plants serving a population of 182,070. Fourteen communities, including three also considered with those having primary treatment plants, discharge untreated sewage of a sewered population of 109,595. Of the industries discharging wastes directly to streams, one has a treatment plant, eleven have no treatment facilities, and two have undetermined facilities.

The design capacity of 25 municipal treatment plants is satisfactory and that at 13 is unsatisfactory. The operation of 22 is satisfactory and of the remainder unsatisfactory. The one industrial treatment plant is satisfactory in regard to design capacity and operation.

Four municipal plants were built in 1949 to serve a population of 16,275. Eighteen new municipal plants to serve 115,770 people are needed. Enlargement or additions are needed at six municipalities to serve 106,920 persons. Eight new industrial plants are required.

No formal action to abate pollution has been taken with 19 municipalities or 11 industries. Final plans have been approved for abatement at two municipalities, and one new municipal treatment plant is under construction.

Table A_9. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	43	319,845	235,430
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	—	Not applicable
Total	43	319,845	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_9. Sources of pollution, industrial*

Industries	Sources of pollution, (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	12	20,100
Producing organic wastes	0	Undetermined
Producing inorganic wastes	**3	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***14	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**One included also under organic wastes.

***Total adjusted to correct for duplication noted in footnote marked,**.

Table C_9. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	21	24	28,180
Secondary	11	14	182,070
No treatment	**14	--	109,595

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Three municipalities also included in primary treatment for a portion of their sewage.

Table D_9. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Textile mill products......	11	1	10	0
Chemical and allied products.................	3	--	1	2
Total..................	14	1	11	2

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_9. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	38	25	13	0	22	16	0
Industrial	1	1	0	0	1	0	0

Table F_9. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	4	16,275	0	--

Table G_9. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	18**	115,770	7
Enlargement or additions to existing plant	6***	106,920	--
Replace existing plant	0	--	--
No project required	28****	97,155	3***
Undetermined	0	--	4

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Six municipalities with seven plants classified as unsatisfactory in capacity, have been considered as requiring new plants rather than replacement.

***Two plants now satisfactory as to capacity require enlargements or additions in order to provide for a higher degree of treatment. The municipalities at which these plants are located have one other plant each, not requiring projects.

****Three municipalities and two industries not having treatment facilities are classified as requiring no project since the disposal of their wastes is considered satisfactory at the present time.

Table H_9. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	19	11
Abatement ordered	0	0
Plans under preparation	0	0
Final plans approved	2	0
Construction awaiting financing	0	0
Under construction	1	0
Status undetermined	2	0

Table I9. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Acme:			
Fertilizer plant	Not known	Undetermined	--
Altamahaw:			
Textile mill	100	New plant	--
Asheboro	5,000	New plant	Final plans approved
Burlington #1	5,000	New plant	--
#2	9,000	New plant	--
Carthage	925	New plant	--
Clinton	2,120	New plant	--
Durham	15,000	Enlargement of existing plant	--
Elon College	400	New plant	--
Erwin:			
Textile mill	2,000	New plant	--
Fayetteville	34,605	New plant	--
Franklinville:			
Textile mill	2,000	New plant	--
Fuquay Springs	1,000	Addition to existing plant	--
Gibsonville	1,000	Addition to existing plant	--
Glen Raven:			
Textile mill	1,600	New plant	--
Graham	2,100	New plant	--
Greensboro #1	54,000	Addition to existing plant	--
#2	30,000	Enlargement and addition to existing plant	--
Fertilizer plant	Not known	Undetermined	--
Textile mill	Not known	New plant	--
Haw River:			
Textile mill	2,000	Undetermined	--
Liberty	920	Addition to existing plant	--
Lillington	740	New plant	--
Mt. Olive	2,150	New plant	--
Navassa:			
Fertilizer plant	Not known	Undetermined	--
Reidsville #1	1,500	New plant	--
#2	5,000	New plant	--
Saxapahaw:			
Textile mill	Not known	New plant	--
Southern Pines	2,500	New plant	Under construction
Southport	1,630	New plant	--
Swepsonville:			
Textile mill	Not known	New plant	--
Wallace	600	New plant	--
Warsaw	1,000	New plant	--
Wilmington #1	22,000	New plant	Final plans approved
#2	22,000	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

YADKIN-PEE DEE RIVER SUB-BASIN

General Description

The Yadkin-Pee Dee River Sub-Basin lies primarily within the State of North Carolina, but a small area of Virginia, drained by the Ararat River, is also included. The total drainage area is approximately 7,270 square miles. The sub-basin is bounded on the northeast by the Roanoke and Cape Fear River Sub-Basins, on the south by the Pee Dee River Sub-Basin, on the southwest by the Catawba-Wateree River Sub-Basin, and on the northwest by the Kanawha River Sub-Basin.

The Yadkin River rises on the eastern slopes of the Blue Ridge Mountains in North Carolina. It flows northeasterly for about 100 miles, then southeasterly to the junction of the Uwharrie River where it becomes the Pee Dee River. That portion of the Pee Dee which extends from this junction 57 miles down stream to the South Carolina Sate boundary, is considered to lie in the Yadkin-Pee Dee River Sub-Basin.

While the river originates in the Mountain Region, the major portion lies in the Piedmont Plateau. Surface characteristics of this region are rolling hills rising from 700 feet in the eastern part to an average elevation of 1,200 feet toward the western limits of the area.

The mean annual temperature of the sub-basin varies from 56° F. at the western end to 61° F. in the south-central portion. The average annual rainfall varies from 46 to 47 inches. A 20-year record of the U.S. Geological Survey gauge at Rockingham, N.C., where the drainage area is 6,870 square miles, indicates an average discharge in cubic feet per second of 7,870, a maximum discharge of 270,000, and a regulated minimum of 143.

The population of the sub-basin was 652,874 based on the 1940 census. The preliminary 1950 census gives a population of 723,608.

Economic Development

There are 16 urban communities and part of another in the sub-basin. The urban population constitutes 32 percent of the total population. One of these cities, Winston-Salem, has a population of approximately 86,816. Eight others have populations in excess of 10,000.

The Yadkin-Pee Dee Sub Basin is one of the most highly industrialized sections of North Carolina. The major industries are the manufacturing and processing of textiles, tobacco products, furniture, lumber, aluminum, fertilizer, food products, and include printing, foundaries, tanneries and a small paper board mill. The great textile industry of the State is centered here and in the Catawba-Santee Sub-Basin just to the west of this sub-basin.

The soils of the sub-basin are adapted to the growing of a wide variety of crops. Chief among these are tobacco, cotton and corn. In the Sand Hill region peaches and other fruits are the principal products.

Use of Water Resources

There are 45 public water supplies in the sub-basin serving a total of 273,730 persons. Twenty-eight supplies (including some using both surface and underground water) are taken from surface sources.

Existing and proposed hydroelectric developments on the river are numerous. Twelve of these, all privately owned and having a combined capacity of 302,815 HP, are already in existence. The U.S. Army Engineers has proposed eight additional major projects correlated with flood control.

Although there is abundant opportunity for recreational development, especially on the lakes formed by hydroelectric dams, only a beginning has been made toward this end. Some swimming, boating, and bathing is done. Game fish are found in the mountain streams of the headwaters.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{10} through I_{10}, inclusive.

There are 47 municipalities in the sub-basin with a sewered population of 223,248. Forty-six, with a sewered population of 221,948, discharge waste with a population equivalent of 440,506. Nine industries discharge directly to watercourses organic wastes with a population equivalent of 109,000. The population equivalent of waste discharged by one industry is not known.

Twenty-one municipalities have primary treatment plants which serve a population of 113,852. Sixteen municipalities have twenty secondary treatment plants serving 66,750 people. Eleven communities with a contributory population of 42,646, including one having a primary treatment plant for part of its sewage, discharge wastes without treatment. Of the nine industries, one is known to have waste treatment facilities.

Of the forty-one municipal treatment plants, the design capacity of 24 is satisfactory, that of 15 is unsatisfactory, and that of two is undetermined. The operation of 31 is satisfactory, that of seven is unsatisfactory, and that of three is undetermined.

Seven municipal waste treatment plants with a combined design population of 17,550 were constructed during the period 1946-1949. Eighteen new plants to serve 83,720 persons, replacement of one plant serving 80,000 persons, and enlargements or addtions to six plants serving a population of 8,027 are required to abate pollution in the sub-basin. The requirements of seven industries and three municipalities are undetermined.

No formal action has been taken with 22 municipalities and ten industries to abate pollution. Final plans have been approved at two municipalities. Construction is awaiting financing at two others.

Table A_{10}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	46	221,948	440,506
Having population data available (Data on pollution load to watercourse incomplete or not available)	1	1,300	Not applicable
Total	47	223,248	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{10}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	9	109,000
Producing organic wastes	1	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	10	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{10}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	21	21	113,852
Secondary	16	20	66,750
No treatment	**11	--	42,646

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in primary treatment.

Table D_{10}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Textile mill products.....	10	1	--	9

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{10}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	41	24	15	2	31	7	3
Industrial	1	--	--	1	--	--	1

Table F_{10}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	2	3,500	0	--
1948	0	--	0	--
1949	5	14,050	0	--

Table G_{10}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**18	83,721	3
Enlargement or additions to existing plant	***6	8,027	--
Replace existing plant	1	80,000	--
No project required	****24	48,300	--
Undetermined	[1]3	3,200	7

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in changes in these needs.

**Nine municipalities with ten plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements. One municipality also requires a new plant for part of its sewage.

***Two plants now satisfactory as to adequacy, require enlargements or additions in order to provide for a higher degree of treatment.

****Two municipalities not having treatment facilities are classified as requiring no project, since the disposal of their waste is considered satisfactory at present.

[1] One municipality with a plant classified as unsatisfactory in capacity has not had project requirements determined.

Table H_{10}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	22	10
Abatement ordered	—	0
Plans under preparation	--	0
Final plans approved	2	0
Construction awaiting financing	2	0
Under construction	—	0
Status undetermined	2	0

Table I_{10}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Badin	3,100	Addition to plant	--
Concord	19,000	New plant	Construction awaiting financing
Textile plant	Not known	New plant	--
Denton	677	Addition to plant	--
Elkin	2,300	New plant	--
Hamlet	4,125	New plant	--
Huntersville	500	New plant	--
Textile mill products industry	2,000	Undetermined	--
Jonesville	196	New plant	--
Kannapolis:			
Textile plant	5,000	New plant	--
Lexington	12,500	Three new plants	--
Lilesville	500	Enlargement of existing plant	--
Mooresville	6,200	New plant	Construction awaiting financing
Textile mill products industry	19,000	New plant	--
Morven	250	Addition to plant	--
Mt. Airy	6,000	New plant	--
N. C. Dyeing & Finishing Co.	1,000	Undetermined	--
Textile mill products industry	72,000	Undetermined	--
North Wilkesboro	3,500	New plant	--
Norwood	1,300	Undetermined	--
Pilot Mountain	900	Undetermined	--
Rockingham	3,600	New plant	--
Rural Hall Sanitary District	1,000	Addition to plant	--
Salisbury	15,000	New plant	Final plans approved
Spencer	3,000	New plant	Final plans approved
Star	500	New plant	--
Thomasville #1	5,000	New plant	--
#2	2,500	Addition to plant	--
Troy	1,400	New plant	--
Textile mill products industry	2,100	Undetermined	--
Wilkesboro	900	New plant	--
Winston Salem	80,000	Replace existing plant	--
Textile mill products industry	210	Undetermined	--
Textile mill products industry	5,000	Undetermined	--
Textile mill products industry	2,700	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

PEE DEE RIVER SUB-BASIN

General Description

The Pee Dee River Sub-Basin is bounded on the northeast by the Cape Fear River Sub-Basin, on the southeast by the Atlantic Ocean, on the southwest by the Santee-Cooper and Catawba-Wateree River Sub-Basins, and on the northwest by the Yadkin-Pee Dee River Sub-Basin. The river flows in a southeasterly direction to empty into Winyah Bay on the South Carolina coast. The sub-basin comprises 10,400 square miles, 7,735 of which lie in South Carolina and the remainder in North Carolina.

The sub-basin is made up mostly of relatively level land. Gradients are moderate and most streams are comparatively free from silt.

The mean annual rainfall varies from 43 to 48 inches. A nine-year record of the U.S. Geological Survey gauge near Mars Bluff, S.C., where the watershed area is 8,870 square miles, shows a maximum discharge of 220,000 cubic feet per second and a minimum flow of 900 cubic feet per second, both of which are partially regulated.

The climate of the area is mild. Rainfall is well distributed throughout the year and floods are rare. The mean annual temperature varies from 61° F. to 64° F.

The population of the sub-basin was 634,806 based on the 1940 census. The preliminary 1950 census indicates a population of 691,225.

Economic Development

There are 21 urban communities in the sub-basin having a combined population of 137,170, or 20 percent of the total. Eighteen of these communities lie in South Carolina. The largest is Florence, S.C. which has a population of 22,378, of which only a little over one-half is at present sewered.

Industrial operations are not extensive. The principal industry is the manufacture of paper pulp and paper products, with the largest plants being located on the coast. Textile plants are located in the central and northern portion of the sub-basin.

Agriculture is the principal economic activity of the sub-basin. The chief crop is tobacco. Considerable cotton is also grown. Other crops include corn, truck produce, strawberries and melons.

Use of Water Resources

There are 59 public water supplies in the sub-basin serving 179,340 people. Eight of these are from surface supplies and serve a population of 26,050.

Recreational activities are largely confined to hunting and fishing in the interior portions, with extensive commercial development of beach areas on the coast. Fish are plentiful and thus afford some commercial operations in coastal waters.

No hydroelectric developments are in operation in the area because of the generally unsuitable terrain.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{11} through I_{11}, inclusive.

There are 49 sewered municipalities in the sub-basin serving 121,647 people. The pollution from these municipalities is reduced by treatment to a population equivalent of 94,277. Three industries contribute organic waste having a population equivalent of 507,700 directly to watercourses. Three others produce organic waste of unknown strength. Two additional ones produce wastes of undetermined type.

Twenty-nine municipalities have 32 primary treatment plants serving a population of 51,370. Eight communities have nine secondary treatment plants serving a population of 35,900. Thirteen communities, including one also having primary treatment for a part of its sewage, with a connected population of 34,377, provide no treatment. Three of the eight industries provide for waste treatment.

Of forty-one municipal treatment plants, 25 have satisfactory capacity and 31 are satisfactory with respect to operation. Sixteen municipal plants are unsatisfactory as to capacity and ten as to operation. Two of the industrial waste treatment plants are satisfactory in operation but unsatisfactory in capacity. The status of the third industrial plant is undetermined.

Four municipal sewage treatment plants designed to serve a population of 23,000, and one industrial waste treatment plant designed to treat wastes with a population equivalent of 18,000 were constructed during the period 1946-1949.

Requirements to abate pollution in the subbasin are 13 new municipal plants to serve a population of 46,040, and four new industrial treatment plants, additions to nine municipal plants serving 9,750 people and to three industrial waste treatment plants, and replacement of one municipal plant serving 1,500 persons. The requirements at one industrial establishment are undetermined.

No formal action to abate pollution has been taken with 16 municipalities and six industries. Abatement has been ordered at two municipalities. Plans are under preparation at three others, and final plans have been approved at one more. One municipal and one industrial waste treatment plant are under construction.

Table A_{11}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	49	121,647	94,277
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	Not applicable
Total	49	121,647	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{11}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	3	507,700
Producing organic wastes	3	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	2	Undetermined
Total	8	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{11}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	29	32	51,370
Secondary	8	9	35,900
No treatment	**13	--	34,377

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in primary treatment.

Table D_{11}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having: Treatment facilities	No treatment facilities	Undetermined facilities
Textile mill products......	2	1	1	0
Paper and allied products.................	3	2	1	0
Chemical and allied products.................	2	0	2	0
Miscellaneous..............	1	0	1	0
Total.................	8	3	5	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{11}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to: Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	41	25	16	0	31	10	0
Industrial	3	--	2	1	2	--	1

Table F_{11}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	1	1,000	0	--
1948	2	10,000	1	18,000
1949	1	12,000	0	--

Table G_{11}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**13	46,040	4
Enlargement or additions to existing plant	***9	9,750	****3
Replace existing plant	1	1,500	--
No project required	[1]31	64,357	--
Undetermined	0	--	1

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Six municipalities with plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements. One of these municipalities has three outfall sewers and is also included as needing an addition and in the no project category.

***Two plants now satisfactory as to adequacy, require additions or enlargements in order to provide for a higher degree of treatment.

****Includes one industrial waste treatment plant, the capacity of which is undetermined.

[1] Two municipalities with plants classified unsatisfactory in capacity, have been considered as requiring no projects. Six other municipalities not having treatment facilities are classified as requiring no project since the disposal of their wastes is also considered satisfactory at the present time.

Table H_{11}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	16	6
Abatement ordered	2	0
Plans under preparation	3	0
Final plans approved	1	0
Construction awaiting financing	0	0
Under construction	1	1
Status undetermined	0	1

Table I$_{11}$. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Gibson	200	Addition to plant	—
Raeford	1,000	New plant	—
Red Springs	500	New plant	—
SOUTH CAROLINA			
Bennettsville	4,300	Addition to plant	—
Bishopville	2,300	New plant	Final plans approved
Chesterfield	1,500	Replace existing plant	—
Clio	700	Addition to plant	—
Conway	3,000	New plant	Plans under preparation
Dillon	3,000	New plant	—
Florence	12,000	New plant	Plans under preparation
Railroad shops	Not known	New plant	—
Florence Air Base	2,000	New plant	Plans under preparation
Georgetown	6,500	New plant	—
Chemical and allied products industry	Not known	Undetermined	—
Paper container manufacturing industry	492,700	Addition to plant	—
Kraft paper mill	Not known	New plant	—
Hartsville:			
Paper and allied products	5,000	Addition to plant	Planning in progress***
Textile dyeing mill	10,000	Addition to plant	—
Hemingway	850	Addition to plant	—
Kershaw:			
Cotton oil plant	Not known	New plant	—
Textile mill products industry	Not known	New plant	Under construction
Lamar	540	New plant	—
Manning #1	200	Addition to plant	Abatement ordered
#2	1,000	New plant	Abatement ordered
Marion	2,000	New plant	—
McCall	1,200	Addition to plant	—
Mullins	4,200	New plant	—
Pageland	800	Addition to two plants	—
Sumter	8,000	New plant	Under construction
Timmonsville	1,500	Addition to plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

***Active research being conducted regarding treatment methods.

CATAWBA-WATEREE RIVER SUB-BASIN

General Description

The Catawba-Wateree Sub-Basin is bounded on the northeast by the Yadkin and Pee Dee Sub-Basins, on the southeast by the Santee Sub-Basin, on the southwest by the Congaree Sub-Basin, and on the northwest by the Tennessee River Basin. The sub-basin comprises an area of about 5,580 square miles, of which 3,250 are in North Carolina and 2,330 in South Carolina. The Catawba River rises on the eastern slope of the Blue Ridge mountains in North Carolina and flows first in an easterly direction for about 80 miles, then turns abruptly and flows almost due south, for about 215 miles to where it joins the Congaree River near Columbia, S.C. About midway of its South Carolina portion the name changes to Wateree River (at Wateree Pond).

The elevation of the headwaters at Lake James, 150 miles from the North Carolina-South Carolina State line is 1200 feet; while at the State line the elevation is 510 ft., giving an average slope of 4.6 feet per mile. The Catawba River, rising in the mountain region and flowing through the Piedmont Plateau causes extensive erosion with resultant muddy water in the mainstem and most tributaries.

The mean annual temperature varies from about 50° F. in the northern part of the sub-basin to 63° F. in the southern portion. Rainfall is rather well distributed throughout the year and occasional floods are local in character. The average annual rainfall varies from 46 to 50 inches throughout the sub-basin. An 18-year record of the U.S. Geological Survey gauge on the Wateree River near Camden, S.C., shows the average discharge to be 5,775 cubic feet per second. River flows are regulated by power developments on the stream and the minimum reported flow was 170 cubic feet per second. The 1940 population of the sub-basin was 560,538. Preliminary reports of the 1950 census indicate a total population of 668,980, of which 77 percent is in North Carolina.

Economic Development

There are 20 urban communities in the sub-basin, having a population of 276,393, representing 41 percent of the total sub-basin population. Of the 20 communities 13 are in North Carolina and seven in South Carolina. The largest concentrations of population are in towns located on the mainstem of the river. The Catawba-Wateree River Sub-Basin is located in the heavily industrialized region of the Carolinas. Industrial distribution is similar to population distribution, the largest concentrations being in towns located on the main river. The principal industry is textiles and includes two large synthetic fiber plants. Smaller towns scattered throughout the sub-basin have a considerable number of textile plants, generally devoted to spinning and weaving. This sub-basin is a part of what may be termed the center of marked industrial development of the south, a development in which hydroelectric power of the Santee River system and its tributaries has played a leading part. The numerous cotton mills of the sub-basin constitute a large part of those in the two Carolinas and a considerable percent of spindle installations in the United States. Other industries have taken advantage of the ample supply of dependable power, excellent transportation facilities and available labor.

Agriculture is extensively practiced throughout the sub-basin: in the mountain region where the soils have been cleared, a large amount of corn, hay, potatoes, fruit and small grain is produced. In the Piedmont section of the sub-basin the soil texture ranges from sandy loams to clay loams and clay which produce a great range of agricultural products. Clover, forage and hay crops are grown in the clay loams, tobacco in the sandy loam while cotton and corn are grown extensively in the heavier clay soils. Cotton is the principal agricultural product, this being one of the best regions in the south for its cultivation. Dairying is a growing industry due to favorable conditions for raising hay and forage. Lumbering is carried on to some degree in all portions of the sub-basin.

Use of Water Resources

There are 40 public water supplies in the sub-basin of which 24 are obtained from surface waters, representing 93 percent of the population served by public supplies. Several of these are taken from the mainstem of the Catawba River.

Waters of the sub-basin are extensively used for recreation, principally fishing, with considerable boating, swimming and hunting. The most intensive use for these purposes is found on the impounded reservoirs. Fish are relatively abundant and migratory waterfowl including duck and geese appear in significant numbers.

The hydroelectric resources of the sub-basin, both in North Carolina and South Carolina have been extensively developed. Developments in the two States consist of 17 impoundments.

The rivers and streams of the Catawba-Wateree Sub-Basin are not navigable except for small pleasure craft and these only on lakes formed by the power dams.

Pollution and Pollution Control

Available data regarding the sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in Tables A_{12} through I_{12}, inclusive.

There are 44 municipal sources of pollution in the sub-basin having a total connected sewered population of 230,945. Forty-three of these with a sewered population of 227,145 are known to discharge wastes with a population equivalent of 206,653 to watercourses of the sub-basin. The amount of pollution discharged by three municipalities having a population of 3,800 is unknown. Of the 30 industrial establishments in the sub-basin discharging wastes directly to a watercourse, twenty-three produce organic wastes having a population equivalent of 125,025. The amount of pollution discharged by six industries producing organic wastes and the type and amount produced by one industry is undetermined.

Existing municipal treatment facilities consist of 38 primary treatment plants serving 41,955 persons at 23 municipalities and 20 secondary treatment plants serving 140,840 persons at 16 municipalities. The sewage from 48,150 persons at eight municipalities receives no treatment. One industry in the sub-basin has treatment facilities for its wastes and the remaining twenty-nine do not provide treatment.

The adequacy with relation to capacity and operation of the one industrial waste treatment plant in the sub-basin is undetermined. The capacity of 34 of the municipal sewage treatment plants in the sub-basin is satisfactory and the remaining 24 is unsatisfactory. Operation of 47 municipal treatment plants is considered to be satisfactory, the remainder being unsatisfactory.

During the period 1946 through 1949, 11 projects to abate pollution in the sub-basin were completed. These projects included ten new plants, having a designed population of 13,900 and one plant enlarged to a designed population of 8,000. No industrial waste treatment plants were constructed during the period.

Requirements for municipal and industrial waste treatment plants to abate pollution in the sub-basin consist of 14 new municipal plants to serve a population of 52,300 and four industrial waste treatment plants, enlargement or additions to 16 municipal plants to serve 120,340 and replacement of five existing municipal plants serving a population of 8,400. An addition is required to the treatment facilities of one industrial plant. No project is required at twenty-nine municipalities with a sewered population of 50,905 or at five industrial establishments. The requirements at two municipalities having a population of 3,300 and 20 industrial establishments remain undetermined.

Two municipal treatment plants are under construction, final plans for one have been approved and plans are under preparation for five plants. No formal action has been taken with 23 municipalities or 25 industrial establishments requiring projects to abate pollution in the sub-basin.

Table A_{12}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	43	227,145	206,653
Having population data available (Data on pollution load to watercourse incomplete or not available)	***3	3,800	Not applicable
Total	****44	230,945	-

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes two municipalities also listed as having data on pollution load discharged to watercourses for a portion of their sewage.

****Total corrected to adjust for duplication noted in footnote above.

Table B_{12}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	23	125,025
Producing organic wastes	6	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	1	Undetermined
Total	30	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{12}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	23	38	41,955
Secondary	16	20	140,840
No treatment	**8	—	48,150

*Includes incorporated and unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Three municipalities also included in primary treatment.

Table D_{12}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Textile mill products......	22	1	21	0
Paper and allied products..	3	0	3	0
Miscellaneous..............	5	0	5	0
Total..................	30	1	29	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{12}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	58	34	24	0	47	11	0
Industrial	1	—	—	1	—	—	1

Table F_{12}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	1	2,000	0	--
1948	4	9,500	0	--
1949	6	*10,200	0	--

*Includes enlargement of one treatment plant to a design population of 8,000.

Table G_{12}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**14	52,300	4
Enlargement or additions to existing plant	***16	120,340	1
Replace existing plant	****5	8,400	--
No project required	[1]29	46,605	5
Undetermined	[2]2	3,300	20

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes nine plants at six municipalities classified as unsatisfactory in capacity that are considered to require new plants rather than replacements.

***Includes five plants at three municipalities that have been classified as satisfactory in capacity, but are considered to require enlargements or additions in order to provide for a higher degree of treatment.

****Includes three plants, classified as satisfactory in capacity at one municipality, that have been considered to require replacements in order to provide for a greater degree of treatment.

[1] Includes three municipalities without treatment and one municipality with two plants classified as unsatisfactory in capacity whose disposal of their wastes is considered satisfactory at the present time.

[2] Two municipalities with plants classified as satisfactory in capacity, have not had project requirements determined.

Table H_{12}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	23	25
Abatement ordered	—	0
Plans under preparation	5	0
Final plans approved	1	0
Construction awaiting financing	—	0
Under construction	2	0
Status undetermined	6	0

Table I_{12}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
NORTH CAROLINA			
Belmont	3,500	New plant	--
Bessemer City	2,500	Two new plants	--
Charlotte	80,000	Addition to two plants	Under construction
Paper and allied products industry	Not known	Undetermined	--
Textile mill	Not known	Undetermined	--
Miscellaneous industry	Not known	Four undetermined	--
Cramerton:			
Textile mill	5,000	Undetermined	--
Dallas	1,700	Addition to plant	--
Gastonia	26,000	Addition to plant	--
Hickory	6,600	Replace four existing plants	Plans under preparation
Homestead:			
Textile mill	1,000	Undetermined	--
Lowell:			
Textile mill	1,270	Undetermined	--
Marion	1,800	Replace existing plant	Plans under preparation
Textile mills	1,200	Five undetermined	--
Morganton (Three outfalls)	6,500	New plant	Final plans approved
State Insane Hospital	3,000	Addition to plant	--
State School for Deaf	450	Addition to plant	--
Textile mill	1,600	Undetermined	--
Mount Holly	3,600	New plant	--
Textile mill	3,950	New plant	--
Textile mill	2,316	Addition to plant	--
Newton	1,000	Addition to plants (2)	--
Old Fort	700	New plant	--
Textile mill	3,500	Undetermined	--
Pineville	1,200	Additions to two plants	--
Stanley	1,500	Undetermined	--
Taylorsville	690	Enlarge existing plant	--
Valdese	2,300	Additions to two plants	--
Textile mills	1,430	Four undetermined	--
SOUTH CAROLINA			
Camden	400	New plant	--
Clover #1	600	New plant	--
#2	1,500	New plant	--
#3	500	New plant	--
Eureka Mill Village	1,800	Undetermined	--
Fort Mill #1	2,000	Addition to plant	--
#2	1,000	Addition to plant	--
#3	1,000	Addition to plant	--
Great Falls	5,000	New plant	--
Lancaster	6,000	New plant	--
Textile bleachery	6,000	New plant	--
Lando:			
Textile mill	300	New plant	--
Rock Hill	18,000	New plant	--
Textile mill	100,000	New plant	--
York	3,500	New plant	--

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*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

CONGAREE RIVER SUB-BASIN

General Description

The Congaree River Sub-Basin is bounded on the north and northeast by the Catawba-Wateree River Sub-Basin, on the southeast by the Santee River Sub-Basin, on the south by the Edisto-Combahee River Sub-Basin, on the southwest by the Savannah River Sub-Basin, and on the west by the Tennessee River Basin. The Congaree River proper is very short, extending only about 35 miles from the junction of its main tributaries, the Saluda and Broad Rivers, to its confluence with the Catawba-Wateree River to form the Santee River. The total area of the sub-basin is approximately 8,386 square miles of which 6,936 are in South Carolina and 1,450 are in North Carolina.

The Broad River rises on the eastern slope of the Blue Ridge mountains in North Carolina, and flows in a general southeasterly direction to its junction with the Saluda River near Columbia, S.C. The Saluda River rises in South Carolina near the North Carolina State line.

The topography in the northern portion of the sub-basin is very hilly, while the Congaree proper begins at the fall line and proceeds through relatively flat country. The Broad River, where it rises in North Carolina, has an elevation of 4,000 feet. At the headwaters of Lake Lure, it has an elevation of 1,000 feet, and 51 miles below, where it crosses into South Carolina, the elevation is about 580 feet, making the average slope of the river 8.2 feet per mile in North Carolina. The fall is concentrated, however, at numerous shoals and rapids. Waters in South Carolina are generally very muddy due to erosion--which is most severe in the upstream portions.

Climate is generally mild with average annual temperature decreasing from about 62°F. in the southern part of the sub-basin to 56°F. in the extreme upper part.

Mean annual precipitation varies from about 46 inches in the southeast central part of the sub-basin to 57 inches in the northwest corner. Rainfall is fairly evenly distributed throughout the year; floods are infrequent and generally of local character.

The 1940 population of the sub-basin was about 758,876, of which 70 percent was rural. The preliminary 1950 census indicates the sub-basin population to be 850,134.

Economic Development

There are 23 urban communities and part of a twenty-fourth in the sub-basin having a combined population of about 297,878 according to the 1950 preliminary census. This urban population represents 35 percent of the total sub-basin population. Population is rather uniformily distributed down to the junction of the Broad and Saluda Rivers. Columbia, the capital of South Carolina, is located at this junction.

Agriculture is practiced extensively throughout the sub-basin. Crops are considerably diversified and highly productive. The area produces significant quantities of cotton, corn, and grain. Tobacco is grown in the North Carolina part of the sub-basin. Dairying is a growing industry due to favorable conditions for raising hay and other forage crops. The area also produces a very high yield of peaches and some other fruits.

Industry is well distributed through the entire area with the heaviest concentrations in the far up-stream portions of the sub-basin. The Congaree River Sub-Basin is, in general, located in what may be termed the industrial region of the Carolinas. The principal industry is textile, manufacturing with plants covering the entire field from spinning and weaving to finishing, dyeing, printing and garment manufacture. Plants are most highly concentrated in the larger cities, but are also found in many smaller towns throughout the sub-basin.

Use of Water Resources

There are 71 public water supplies in the sub-basin serving a population of 488,865. Thirty-six of these serving 436,250 are from surface supplies.

General recreation, hunting and fishing, and power development are closely connected in this sub-basin. The impounded waters of the several hydroelectric developments in the area are extensively used for these purposes and various smalier streams are extensively fished. Swimming is hampered in many streams by high turbidity and a few streams are so highly polluted as to make them unfit for all recreational purposes.

Commercial navigation is confined to the Congaree River proper and is very light at present. Numerous small pleasure craft are used on lakes formed by power dams.

The hydroelectric resources of the river, both in North and South Carolina have been extensively developed almost entirely by private power companies.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{13} through I_{13}, inclusive.

There are 74 sources of municipal pollution in the sub-basin. Seventy-three have a combined sewered population of 361,390 and discharge waste with a population equivalent of 250,945. Population served and pollution discharged data are not available for one military installation.

Thirty-three industries in the sub-basin produce organic wastes having a population equivalent of 262,164. The amount of pollution discharged by three industries producing organic wastes is undetermined. Two industries in the sub-basin produce inorganic wastes.

Thirty-eight municipalities having a combined population of 95,540 treat their sewage at 58 primary treatment plants. In addition, there are 21 secondary treatment plants at 19 municipalities serving a population of 155,380. Nineteen municipalities (including a part of one municipality also listed under secondary treatment) having a combined sewered population of 110,470 provide no treatment. Of the 38 industries discharging pollution directly to watercourses of the sub-basin, 16 have waste treatment facilities.

The adequacy with relation to capacity and operation of treatment facilities at one military installation is undetermined. Of the 78 municipal treatment plants, 29 are satisfactory with respect to design capacity and 49 are unsatisfactory. Sixty-five are satisfactory and thirteen are unsatisfactory with respect to adequacy of operation. Adequacy with relation to capacity of eight industrial waste treatment plants is satisfactory, seven unsatisfactory and that of one remains undetermined. Of the 16 industrial waste treatment plants 11 are satisfactory with respect to operation, four unsatisfactory, and one undetermined.

Nine new municipal treatment plants to serve 37,150 people were constructed during the period 1946 through 1949. Six industrial waste treatment plants to treat wastes having a population equivalent of 11,600 were constructed during this same period.

Forty-two new municipal treatment plants to serve a total population of 137,570 and 16 new industrial waste treatment plants are required to abate pollution in the sub-basin. Additions or enlargements to 19 municipal treatment plants serving a population of 99,425 and additions or enlargements to four industrial waste treatment plants are required. Replacement of one existing municipal plant treating sewage from 900 people is necessary and project requirements for six municipalities and five industries are undetermined. No project is required at 13 industrial establishments or at 29 municipalities having a combined population of 113,765.

No formal action to abate pollution has been taken with 49 municipalities or 24 industries. Five municipal treatment plants are under construction, plans are under preparation at ten municipalities and abatement has been ordered at three, while the status at one remains undetermined. The status of one industrial waste treatment project is also undetermined.

Table A_{13}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	73	361,390	250,945
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	—	Not applicable
Total	***74	361,390	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one U.S. military installation on an inactive status for which no population served or pollution discharged figures are available.

Table B_{13}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	33	262,164
Producing organic wastes	3	Undetermined
Producing inorganic wastes	2	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	38	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{13}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	38	58	95,540
Secondary	**19	21	155,380
No treatment	***19	—	110,470

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one municipality also listed under primary treatment and one U.S. military installation on an inactive status for which no population served figure is available.

***Includes one municipality also listed under secondary treatment.

Table D_{13}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	4	2	2	0
Textile mill products......	31	14	17	0
Chemical and allied products...............	1	0	1	0
Miscellaneous..............	2	0	2	0
Total..................	38	16	22	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{13} Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	*79	29	49	1	65	13	1
Industrial	16	8	7	1	11	4	1

*Includes one U.S. military installation on an inactive status for which the adequacy with relation to capacity and operation of treatment facilities is undetermined.

Table F_{13}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	--
1947	4	15,400	2	3,600
1948	1	250	1	3,000
1949	4	21,500	3	5,000

Table G_{13}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**42	137,570	16
Enlargement or additions to existing plant	***19	99,425	4
Replace existing plant	1	900	—
No project required	****29	113,765	13
Undetermined	[1]6	9,730	5

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions, 29 plants at 22 municipalities classified as unsatisfactory in capacity, have been considered to require new plants rather than replacements. Four of these 29 unsatisfactory plants are to be combined into two new plants.

***Includes two plants classified as satisfactory in capacity that require additions or enlargements in order to provide for a higher degree of treatment. One of these municipalities also has unsatisfactory plants requiring additions.

****Includes six municipalities without treatment that are classified as requiring no project, since the disposal of their waste is considered satisfactory at the present time. Also included is one plant undetermined in capacity whose waste disposal is considered satisfactory at the present. Population served at one military installation is unknown.

[1] Includes six plants at six municipalities the capacity of which is reported satisfactory but for which the project requirements have not been determined.

Table H_{13}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	49	22
Abatement ordered	3	—
Plans under preparation	10	—
Final plans approved	—	—
Construction awaiting financing	—	—
Under construction	5	—
Status undetermined	1	1

Table I_{13}. Project list--municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served***	Project requirements	Remarks
NORTH CAROLINA			
Alexander Mills	700	Addition to plant	--
Cliffside Textile Plants	Not known	Two undetermined	--
Forrest City	4,800	Addition to five plants	--
Lawndale:			
Textile mill products	Not known	Undetermined	--
SOUTH CAROLINA			
Batesburg	2,000	New plant	--
Belton	900	Replace existing plant	--
Blacksburg	1,200	Two new plants	--
High School	800	New plant	--
Cayce	3,600	New plant	--
Columbia	70,160	New plant	--
Fertilizer plant	Not known	New plant	--
Food and kindred products	100	Undetermined	--
Chesnee Mill Village	600	New plant	--
Cherokee Falls:			
Textile mill	900	New plant	--
Chester:			
Textile mill products	1,500	Addition to plant	--
Chick Springs:			
Textile mill products	3,000	Addition to plant	--
Clinton #1	3,400	New plant	Under construction
#2	1,750	New plant	Under construction
#3	2,200	New plant	Under construction
State Training School	1,800	Addition to plant	--
Conestee	700	New plant	--
Textile mill products	200	New plant	--
Cowpens	240	New plant	--
Textile mill products	200	New plant	--
Duncan:			
Miscellaneous industry	Not known	New plant	--
Easley #1	400	Addition to plant	Plans under preparation
#2	3,500	Enlarge plant	Plans under preparation
Eau Claire	2,500	Enlarge plant	--
Enoree	1,000	New plant	--
Fairforest:			
Textile mill	26,700	New plant	--
Fingerville	250	New plant	--
Fountain Inn	1,250	Two new plants	--
Gaffney #1	2,500	New plant	Abatement ordered
#2	3,100	Addition to two plants	Abatement ordered
Textile mill	250	New plant	--
Glendale:			
Textile mill	200	New plant	--
Greenville	50,000	Enlarge plant	Plans under preparation
Textile mill products	60,000	New plant	--
Greer #1	1,000	New plant	Plans under preparation
#2	2,400	Addition to two plants	Plans under preparation
Inman	1,000	New plant	--
Jackson:			
Textile mill	1,100	New plant	--
Jonesville	1,300	New plant	--
Landrum	1,500	New plant	--

See footnotes at end of table.

Table I_{13}. Project list--municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950--Continued

Name	Population served **	Project requirements	Remarks
SOUTH CAROLINA--Continued			
Laurens........................	9,000	Enlarge plant	--
Leesville......................	850	New plant	--
Lexington......................	1,200	New plant	--
Lockhart.......................	1,600	New plant	--
Lyman..........................	2,000	New plant	--
Textile mills................	43,500	New plant	--
Mayo...........................	145	New plant	--
Olympia Mill Village..........	3,000	New plant	--
Pelzer.........................	2,750	New plant	--
Piedmont.......................	3,500	New plant	--
Red Bands Mill Village........	125	New plant	--
Saluda.........................	1,225	Addition to two plants	Plans under preparation
Sharon:			
Poultry industry............	210	Undetermined	--
Simpsonville...................	1,850	Two new plants	--
Slater.........................	1,000	New plants	--
Spartanburg....................	20,000	Addition to plant	--
Textile mills................	7,000	New plant	--
Startex:			
Textile mills................	600	New plant	--
Taylors:			
Textile bleachery...........	65,000	New plant	--
Union..........................	9,000	Two new plants	Plans under preparation
Ware Shoals....................	4,000	Two new plants	--
Textile mills................	28,000	New plant	--
West Columbia..................	2,000	New plant	--
Whitmire.......................	3,100	New plant	--
Whitney:			
Textile plant................	3,000	New plant	--
Winsboro.......................	2,000	New plant	--
Textile mill products.......	1,900	Addition to plant	--
Woodruff.......................	3,000	Two new plants	Under construction

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

SANTEE-COOPER RIVER SUB-BASIN

General Description

The Santee-Cooper River Sub-Basin is located in the south-central portion of South Carolina. It is bounded on the northeast by the Pee Dee River Sub-Basin, on the southeast by the Atlantic Ocean and on the southwest by the Edisto-Combahee River Sub-Basin. The area comprises about 3,230 square miles and includes the drainage of the Santee and Cooper Rivers, and several smaller coastal streams.

The Santee River is formed by the junction of the Congaree and Wateree Rivers at the headwaters of Lake Marion, the impoundment of the Santee-Cooper hydroelectric development. Overflow from Lake Marion is divided, part going to the original course of the Santee River and the remainder going through a diversion canal to Lake Moultrie and thence to the Cooper River which discharges into Charleston harbor.

The area is characterized by relatively wide and shallow river valleys of gentle slope that are generally marshy. Large areas of tidal flats exist along the Atlantic Ocean boundary of the sub-basin.

Climate of the sub-basin is uniformly warm, with mild winters. Heavy frosts are infrequent. Mean annual temperatures vary from about 63°F. to 66°F. Rainfall is well distributed throughout the year and floods are rare. Average annual rainfall varies from 45 to 49 inches in the sub-basin. Discharge of the two principal rivers in the sub-basin is regulated by the Lake Marion and Lake Moultrie impoundments.

In 1940 the population of the sub-basin was estimated to be 192,666. The preliminary 1950 census indicates the population is 231,815.

Economic Development

There are two urban communities in the sub-basin having a combined population of 72,558. The largest is Charleston, S.C., which has a population of 68,243. Population density is rather low, towns being few and small in size except for Charleston. Rural population is less than the average of South Carolina due to extensive areas of marshland.

Agricultural activities in the sub-basin are considerably hampered by the large areas of swamps and wet lowlands. Some progress has been made in converting lowlands to pastures. Cotton and corn are grown wherever possible in the upland areas, and there are extensive truck farms along the coastal region.

Nearly all significant industry is located in or near the city of Charleston. A wide variety of plants are located there including pulp and paper manufacturing, textiles, food processing, wood products, chemical and fertilizer plants. Oysters, shrimp and fish are plentiful in the tidal waters resulting in some commercial operations along the coast.

Use of Water Resources

There are nine public water supplies in the sub-basin serving 82,450 people. Charleston is the only one that uses surface water.

Recreational pursuits are predominantly connected with the presence of large bodies of water. Lake Marion, Lake Moultrie and the coastal waters are used extensively for fishing and wildfowl hunting. There are commercial recreational developments of the beach areas near Charleston.

Major hydroelectric power and navigation developments are confined to the works at Lake Moultrie for electric power, and the provisions of navigation through Lake Marion and Lake Moultrie from the Cooper River. One small hydroelectric plant is located at the spillway on the Santee River.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{14} through I_{14}, inclusive.

There are ten municipal sources of pollution in the sub-basin having a combined population of more than 105,750. This includes those sources for which no population served figures are available. The pollution load contributed to streams by these sources are equivalent to that of 103,230 persons.

A pollution survey of all industrial establishments in the sub-basin has not been completed. One industry, producing paper and allied products, discharges organic waste of unknown strength.

One municipality has a primary treatment plant serving 600 people. Another has secondary treatment serving a population of 3,200. Both municipal treatment plants are adequate with relation to capacity and operation. Eight municipal sources of pollution, having a connected population of 101,950, discharge sewage without treatment. No known industrial waste treatment is provided in the sub-basin.

No municipal or industrial treatment plants were constructed during the period 1946 through 1949.

Requirements to abate pollution in the sub-basin are 13 new municipal treatment plants to serve a population of 101,950 and one known industrial waste treatment plant. The project requirement at one municipality is undetermined.

No formal action to abate pollution has been taken with 11 municipalities or the one industry Plans are being prepared for two municipal treatment plants and the project status of one is undetermined.

Table A_{14}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	7	105,750	103,230
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	—	Not applicable
Total	***10	105,750	—

*Includes incorporated or unincorporated munipalities, other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes Ft. Moultrie (Sullivans Island) and two U.S. military installations for which no population served figures are available.

Table B_{14}. Sources of pollution, industrial*

Industries**	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	—
Producing organic wastes	1	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	1	—

*Industries having separate outlets and discharging wastes directly to watercourse.

**A survey of all industrial establishments in the sub-basin has not been completed.

Table C_{14}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	1	1	600
Secondary	1	1	3,200
No treatment	**8	—	101,950

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes Ft. Moultrie (Sullivans Island) and two U.S. military installations for which no population figures are available.

Table D_{14}. Existing treatment facilities industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Paper and allied products..	1	0	1	0

*Industries having separate outlets and discharging wastes directly to watercourse. Survey of industrial establishments in the sub-basin has not been completed.

Table E_{14}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	2	2	0	0	2	0	0
Industrial	0	—	—	—	—	—	—

Table F_{14}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{14}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**13	101,950	1
Enlargement or additions to existing plant	0	—	0
Replace existing plant	0	—	0
No project required	2	3,800	0
Undetermined	1	Not known	0

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Four new plants required by each of two municipalities. One municipality will be served partly by a plant being planned in cooperation with another municipality.

Table H_{14}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	11	1
Abatement ordered	—	0
Plans under preparation	2	0
Final plans approved	—	0
Construction awaiting financing	—	0
Under construction	—	0
Status undetermined	1	0

Table I_{14}. Project list--municipalities and industries requiring improvements for abatement of pollution*

Name	Population served**	Project requirements	Remarks
SOUTH CAROLINA			
Avondale Housing Development..	1,500	New plant	—
Charleston No. 1..............	43,100	New plant	—
No. 2..............	13,500	New plant	—
No. 3..............	10,000	New plant	—
No. 4..............	4,000	New plant	—
Paper and pulp plant........	Undetermined	New plant	—
Fort Moultrie, Sullivans Island.......................	Not known	One new plant	Plans under preparation for a joint plant to serve Ft. Moultrie and Mt. Pleasant No. 1
Mount Pleasant No. 1..........	1,800		
Mount Pleasant No. 2..........	600	New plant	—
Monck Corners.................	1,500	New plant	—
North Charleston No. 1........	8,850	New plant	—
No. 2........	14,000	New plant	—
No. 3........	1,100	New plant	—
No. 4........	2,000	New plant	—
U.S. Army Reservation.........	Not known	Undetermined	—
U.S. Army Reservation.........	Not known	New plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

EDISTO-COMBAHEE RIVER SUB-BASIN

General Description

The Edisto-Combahee River Sub-Basin consists of an irregular area in the south-central portion of South Carolina, bounded on the north by the Congaree Sub-Basin, on the east by the Santee Sub-Basin, on the southeast by the Atlantic Ocean and on the southwest by the Savannah River Sub-Basin. The area comprising about 5,759 square miles is drained by several rivers flowing roughly parallel into the Atlantic Ocean. The principal streams are the Edisto and Combahee Rivers. Of these, only the Edisto River is of considerable length, having two parallel branches which originate near the center of the State.

The land in the sub-basin is predominantly level with extensive areas of salt-marsh along the coast. River courses are in general straight and regular, except in the coastal area.

Climate is uniformly warm over the area, and the mean annual temperature is about 65°F. Average annual rainfall varies from 44 inches in the north part to 49 inches in the south coastal area. Available records on the U.S. Geological Survey gauge at Givhans, S. C., indicate the minimum flow of the Edisto River above the point of Charleston water supply diversion to be approximately 500 cubic feet per second. The drainage area at this point is 2,730 square miles.

The 1940 population of the sub-basin was 225,250. Preliminary 1950 census report indicate a population of 245,243.

Economic Development

There are six urban communities and a part of a seventh in the sub-basin. Urban population in 1940 was nearly ten percent of the total and the preliminary 1950 census indicates an increase to approximately 15 percent. The largest municipality in the sub-basin is Orangeburg having an estimated 1950 population of 15,311.

The area is predominantly agricultural and a large variety of crops are produced, including intensified truck farming of early vegetables, melons and small fruits. Industry is very light, the principal operations being connected with the extensive forests in the lower portion and the shrimp and oyster beds along the coast. These beds are well developed and are an important source of income in the coastal area.

Use of Water Resources

There are 28 public water supplies in the sub-basin serving a combined population of 52,665. Of these, three are surface supplies serving 21,600 or 41 percent of the total public supply.

Fish and wildlife normal to this region are plentiful and afford many opportunities for recreation. The coastal area is particularly favorable for fishing and is used by the great number of people who enjoy this sport and by commercial fishermen.

Water power development is very small and navigation is limited to the waters of the Intracoastal Waterway.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{15} to I_{15}, inclusive.

There are 16 municipal sources of pollution in the sub-basin with a combined sewered population of 37,315, and one source consisting of a U.S. military installation for which no population figure is available. Treatment at 14 municipal sources reduces the pollution load to an equivalent population of 21,505.

Five industries discharge wastes directly to watercourses; three produce organic wastes of an undetermined amount, and wastes from two others are undetermined as to amount and type.

Ten municipalities have primary treatment plants serving a connected population of 11,525. In addition, there are six secondary treatment plants serving 21,390 persons and one military installation the population of which is unknown. No treatment is provided at two municipalities having a sewered population of 4,400. Treatment is provided at one industry producing wastes of an undetermined type and amount.

Nine of the sixteen municipal treatment plants are adequate with respect to capacity and fourteen are satisfactorily operated. The industrial waste treatment plant is reported to be adequate with relation to design and operation.

Two municipal sewage treatment plants were constructed in 1949 to serve a combined population of 5,000. Requirements for abatement of pollution in the sub-basin include six new municipal treatment plants to serve 9,075 people and four new industrial waste treatment plants.

Plans are under preparation for construction of two of the municipal treatment plants and the status of one industrial plant is undetermined. No formal action has been taken with the remaining four municipalities and three industries requiring treatment plants.

Table A_{15}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	16	37,315	21,505
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	—	Not applicable
Total	***17	37,315	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one U. S. military installation, Paris Island Marine Base, for which no population served or pollution discharged figures are available.

Table B_{15}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	—
Producing organic wastes	3	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	2	Undetermined
Total	5	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{15}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	10	10	11,525
Secondary	**6	6	21,390
No treatment	2	—	4,400

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one U. S. military installation for which no population served figure is available and one municipality also included under primary treatment.

Table D_{15}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	1	0	1	0
Chemical and allied products..................	1	0	1	0
Lumber and wood products...	2	0	2	0
Miscellaneous..............	1	1	0	0
Total..................	5	1	4	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{15}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	16	9	7	0	14	2	0
Industrial	1	1	0	0	1	0	0

Table F_{15}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	2	5,000	0	—

Table G_{15}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**6	9,075	4
Enlargement or additions to existing plant	0	--	0
Replace existing plant	0	--	0
No project required	***12	28,240	1
Undetermined	0	--	0

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Five municipalities, with plants classified as unsatisfactory in capacity, have been considered as requiring new plants rather than replacements.

***Includes U. S. military installation for which no population served figure is available and two treatment plants at one municipality. Due to local conditions two plants classified as unsatisfactory in capacity, and one municipality not having treatment facilities are classified as requiring no project since the disposal of their waste is considered satisfactory at the present time.

Table H_{15}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	4	3
Abatement ordered	0	--
Plans under preparation	2	--
Final plans approved	0	--
Construction awaiting financing	0	--
Under construction	0	--
Status undetermined	0	1

Table I_{15}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
SOUTH CAROLINA			
Allendale	1,500	New plant	--
Batesburg	1,400	New plant	--
Beaufort	3,200	New plant	Plans under preparation
Denmark	1,700	New plant	--
Hampton	675	New plant	--
Plywood plant	Not known	One new plant	--
Johnson	600	New plant	Plans under preparation
Orangeburg:			
Chemical plant	Not known	New plant	--
Meat products	Not known	New plant	--
Wood veneer plant	Not known	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

SAVANNAH RIVER SUB-BASIN

General Description

The Savannah River Sub-Basin is a relatively long area and is roughly triangular in shape with one point of the triangle at the Atlantic Ocean near Savannah, Ga. The sub-basin is bounded on the northeast by the Congaree and Edisto-Combahee River Sub-Basins, on the southwest by the Ogeechee and Oconee River Sub-Basins, on the northwest and north by the Chattahoochee River Sub-Basin the Tennessee River Basin. This total area, including small coastal streams near the mouth of the main river, is 10,869 square miles, of which about 4,678 square miles lie in South Carolina, 6,015 square miles in Georgia and a small portion in the mountains of North Carolina.

The headwaters of the Savannah River are on the slope of the Blue Ridge mountains, north of the boundaries between North Carolina, Georgia, and South Carolina. The river in general flows in a southeasterly course and with certain tributaries forms the boundary between Georgia and South Carolina to the Atlantic Ocean. The principal tributaries of the Savannah River are the Tugaloo, Seneca, Keowee, Broad and Little Rivers, and Horse Creek.

The sub-basin is divided into three physiographic areas; the Mountain, Piedmont, and Coastal Plain areas. Elevations in the mountain section of the sub-basin vary from 1,500 feet on the Tallulah River to 5,030 feet at the highest peak in North Carolina. The Piedmont area is essentially an upland of fairly strong relief and has some deep valleys and no lowlands. Exclusive of river valleys its altitude varies from about 500 feet at the fall line to about 1,800 feet. In the Coastal Plain the river beds lack falls and rapids. From the ocean to the fall line the coastal plain consists of terraces and considerably swampy areas adjacent to the river. The slope of the river and its tributaries vary from 0.6 feet per mile below Augusta to 122 feet per mile in the mountains. Many of the tributaries in the upper part of the sub-basin are typical mountain streams flowing in places through rock gorges.

The climate of the upper portion of the sub-basin is relatively temperate. Average temperatures are higher in the downstream section due to the influence of decreasing altitude. Mean annual temperature at Toccoa, Ga., is about 61°F, and at Savannah, 65°F.

Rainfall is very evenly distributed throughout the year; such floods as occur are seldom serious. Mean annual rainfall in the upper part of the sub-basin is about 58 inches and varies from 45 inches in the upper portion of the coastal plain near Augusta to 47 inches at Savannah. The mean annual precipitation is 84.90 inches at Highlands, N. C. The sub-basin lies in the path of hurricanes that usually occur in the late summer and fall, with heaviest rainfall occuring during this period. Discharges in several of the tributaries and the main river are regulated to some extent by power developments. A 21 year record of the U.S. Geological Survey gauge at Augusta, Ga., shows the average discharge to be 10,740 cubic feet per second and the minimum flow recorded was 648 cubic feet per second.

In 1940, the estimated population of the sub-basin was 655,763. The preliminary 1950 census report indicates a population of 712,217.

Economic Development

There are 19 urban communities and parts of two others in the sub-basin. None of these are in North Carolina, ten are in Georgia, and nine and the part of two others are in South Carolina. More than half of the total population in the sub-basin is in Georgia, of which about 51 percent (225,935) is urban.[6] Twenty-two percent (58,807) of the South Carolina population is classed as urban and the overall urban population in the sub-basin is 40 percent of the total.

Agricultural operations are carried on throughout the sub-basin. The soil is adapted to the growing of fruit, truck and grain crops, cotton and hay, and to the production of poultry, eggs, and livestock. The largest farms are found in the downstream areas, since the upstream farmers are considerably hampered by erosion and hilly terrain. Industrial development in the South Carolina portion of the sub-basin is mostly textile. Nearly every town in this part of the area has a textile plant, but production is generally confined to spinning and weaving with few plants engaged in finishing, printing or dyeing.

There are numerous industries in the Georgia part of the sub-basin including kaolin and asbestos mines, textile and textile material production, the manufacture of paper, paper products, and fertilizers, and the production of timber, timber products and naval stores.

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[6] The combined population of Augusta (71,507) and Savannah (119,689) constitute eighty-five percent of the Georgia urban population in the sub-basin.

Use of Water Resources

There are 68 public water supplies in the sub-basin, of which 23 are derived from surface sources. These surface supplies serve a population of 214,150, and ground water supplies serve 136,663 people.

The streams within this sub-basin are extensively used by the local residents for general recreation, hunting, and fishing. Many of the mountain streams are stocked with trout. Due to excessive turbidity found in the lower section of this river fishing is confined mostly to the upper half and its tributaries.

Hydroelectric power is at present just beginning to be fully developed, with a dam and plant under construction at Clark Hill and other being considered at Hartwell. The Clark Hill Reservoir is primarily for power development, and is the first unit in an over-all plan for power, flood control and navigation improvement on the Savannah River. Auxiliary uses of reservoirs will include recreation and wild-life conservation. It is proposed to develop recreational and park areas at several sites in South Carolina and Georgia.

Navigation is generally confined to the downstream portion of the Savannah River, between Augusta and the mouth, but is subject to considerable future development.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{16} through I_{16}, inclusive. The Water Pollution Control Agency of Georgia has not made available to the Southeast Drainage Basins Office data necessary for the completion of these tables.

The information included in these tables for the State of Georgia has been obtained from the "Georgia Water Pollution Comprehensive Report", and "Manufacturers of Georgia", supplemented by data furnished by the Georgia Department of Commerce. The first named source is a report to the municipalities of the State by the State Water Pollution Control Agency, a copy of which was furnished the Southeast Drainage Basins Office. The second is a publication of the Georgia Agricultural and Industrial Development Board.

The "Georgia Water Pollution Comprehensive Report" lists the number of municipalities with and without sewage treatment, but does not give the amount of discharged wastes. No data is given on adequacy of capacity or operation of existing facilities, requirements for pollution abatement, or status of projects for pollution abatement.

No information on industrial pollution was furnished by the Georgia Water Pollution Control Agency. The number of industries in the Georgia area of the sub-basin which are of the type normally considered to discharge wastes with polluting characteristics, and which may or may not discharge wastes directly to watercourses, was arrived at from data obtained from the publication "Manufacturers of Georgia", and information supplied by the Georgia Department of Commerce. The amount of industrial wastes, treatment provided, requirements for and status of pollution abatement for industry in Georgia are therefore listed as undetermined.

There are 55 municipal sources of pollution in the sub-basin having a sewered population of 288,430. Of these, 34 with a sewered population of 98,530 discharge waste with a population equivalent of 88,430. Two communities in South Carolina with a combined population of 5,700 persons contribute an undetermined pollution load. The remaining 19 with a combined population of 184,200 are in Georgia. Data on the pollution load contributed by these municipalities is not obtainable.

One hundred and twenty-four industries, which may or may not discharge wastes directly to a watercourse and are of a type normally considered to have wastes with pollution characteristics, are in the sub-basin. One industry in South Carolina producing organic wastes discharges pollution having a population equivalent of 9,855.

There are 31 municipalities having a total of 43 primary treatment plants serving a population of 81,050. Six municipalities with secondary treatment plants serve a population of 17,400. Sewage from 189,980 at 18 municipalities receives no treatment. No industrial waste treatment plants are reported to exist in the Savannah River Sub-Basin.

Of the 37 municipal sewage treatment plants in South Carolina, only ten are reported adequate with relation to capacity and 15 are satisfactory as to operation. The adequacy with relation to capacity and operation of the 12 treatment plants in Georgia has not been reported.

During the period 1946 through 1949 there were eight municipal treatment plants constructed to serve a combined population of

8,850. No industrial waste treatment plants were reported constructed during this same period.

Requirements to abate pollution in the sub-basin are 28 new municipal plants to serve a total population of 33,080 and one new industrial waste treatment plant and enlargement or addition to eight municipal plants serving a population of 48,550. No project is required at 11 South Carolina municipalities having a combined population of 20,600. The requirements to abate pollution at 19 Georgia municipalities having a combined population of 184,200 remains undetermined. Requirements for 123 industrial establishments are also undetermined.

In South Carolina four new treatment plants are under construction, plans for ten additional treatment plants are being prepared and no formal action has been taken with 22 municipalities and one industry. The status of treatment works projects to abate pollution in Georgia has not been reported.

Table A_{16}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	34	98,530	88,430
Having population data available (Data on pollution load to watercourse incomplete or not available)	21	189,900	Not applicable
Total	55	288,430	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{16}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	9,855
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	**123	Undetermined
Total	124	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes industries (only those types normally considered to discharge waste with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia" prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{16}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipal-ities*	Plants	
Primary	31	43	81,050
Secondary	6	6	17,400
No treatment	18	—	189,980

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{16}. Existing treatment facilities, industrial

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	43	—	—	43
Textile mill products......	6	—	*2	4
Lumber and wood products...	1	—	—	1
Paper and allied products..	1	—	—	1
Chemical and allied products................	62	—	—	62
Products of petroleum and coal.................	2	—	—	2
Fabricated metal products..	5	—	—	5
Miscellaneous.............	4	—	—	4
Total.................	124	—	2	**122

*Information for the two industries in South Carolina, which have separate outlets and discharge wastes directly to watercourse, was furnished by the South Carolina Water Pollution Control Authority.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia" prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table E_{16}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	49	10	27	12	15	22	12
Industrial	—	—	—	—	—	—	—

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{14}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	1	800	0	—
1947	1	4,000	0	—
1948	0	—	0	—
1949	6	4,050	0	—

Table G_{14}. Requirements for municipal and industrial waste treatment plants*+

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**28	33,080	1
Enlargement or additions to existing plant	***6	48,550	—
Replace existing plant	—	—	—
No project required	****11	20,600	—
Undetermined	21	186,200	123

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**One municipality which has no treatment will require two treatment plants. Twelve municipalities with 19 plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements.

***One plant, now satisfactory as to adequacy requires an addition in order to provide for a higher degree of treatment.

****Due to local conditions, one municipality with a plant classified as unsatisfactory in capacity and one municipality without treatment have been classified as requiring no project since the disposal of their wastes is considered satisfactory at the present time.

Table H_{14}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	22	1
Abatement ordered	0	0
Plans under preparation	10	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	4	0
Status undetermined*	21	123

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{16}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
SOUTH CAROLINA			
Abbeville	4,250	New plant	---
Alice Mill Village	1,000	New plant	---
Anderson	41,000	Addition to two plants	Two existing primary treatment plants
Textile mills	9,855	One new plant	---
Textile mill	Not known	One undetermined	---
Arial Mill Village	300	New plant	---
Bath Mill Village	680	New plant	---
Belton	1,800	New plant and addition to existing plant	Both projects under construction
Clearwater and mill village	1,200	Two new plants	---
Clemson	5,500	New plants	---
Due West	1,300	Two new plants	---
Easley	1,250	New plant	---
Edgefield	1,800	Addition to plant	---
Gluck	250	Addition to plant	---
Honea Path	1,200	Addition to plant	Enlargement of sludge beds
Iva	650	New plant	Under construction
LaFrance Mill Village	600	New plant	Engineer employed
Liberty	4,300	Two new plants	Engineer employed
McCormick	1,600	Addition to plant	---
Newry	1,200	New plant	---
Pendleton	300	New plant	---
Pickens	1,250	Three new plants	One under construction
Pickens Mill Village	1,000	One new plant	May be included with municipality
Seneca	3,300	Three new plants	---
Seneca Mill Village	1,500	Additions to plant	---
Walhalla	2,600	Two new plants	Plans under preparation
Westminister	1,800	Two new plants	---

+The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

OGEECHEE RIVER SUB-BASIN

General Description

The Ogeechee River Sub-Basin is bounded on the northeast by the Savannah River Sub-Basin, on the east by the Atlantic Ocean, on the southwest by the Altamaha River Sub-Basin and on the west by the Oconee River Sub-Basin. The river rises in Greene County, Georgia, and flows in a southeastern direction to Ossabaw Sound. Although its headwaters are in the Piedmont Plateau, it flows for all but a short part of its length across the Coastal Plain, and thus carries a relatively light load of silt.

The drainage area of the sub-basin, which is entirely within the State of Georgia, is about 5,355 square miles. It has one major tributary, the Canoochee which enters the main stream near its mouth.

The river is bordered on much of its length by swamp forests. The upland portions of the sub-basin consist of pine forests and farm land.

The climate of the sub-basin is mild. The mean annual temperature varies from 64° F. in the northern part to 67° F. toward the coast. The average annual rainfall is about 46 inches. The frost free growing season averages from 220 to 270 days depending on latitude.

A five-year record of the river gauging station at Eden, Ga., where the drainage area is 2,650 square miles, shows a 24-hour maximum discharge of 23,700 cubic feet per second, a minimum discharge of 258 cubic feet per second, and an average discharge of 1,678 cubic feet per second.

The population of the sub-basin according to the census of 1940 was 153,946. The 1950 preliminary census indicates the population to have decreased to 143,141, or seven percent.

Economic Development

There are two urban communities in the sub-basin having a combined population of 9,532, or about seven percent of the total population. While the urban population increased slightly during the period 1940-1950, the rural population has decreased by nine percent.

The principal natural resources of the sub-basin are its soils and timber supply. The sub-basin is mainly an agricultural area and the major products are corn, peanuts, cotton, tobacco, hogs and cattle, and naval stores.

Industry in the sub-basin is not highly developed. It consists principally of the food and kindred products and chemical and allied products types.

Use of Water Resources

There are fifteen public water supplies in the sub-basin serving a population of 14,800. None of these supplies are from surface sources.

The Ogeechee River and its tributaries provide some of the best fresh water sport fishing in the State of Georgia. In the lower reaches of the Ogeechee, a certain amount of commercial fishing is carried on. In addition, the swamps and forests of the area support a large population of game animals including deer, wild turkeys, and ducks which are hunted extensively in season. The sub-basin offers distinct possibilities for the further development of its recreational potentialities.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table A_{17}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	11	9,750	Not applicable
Total	11	9,750	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{17}. Sources of pollution, industrial

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	--	--
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	*22	Undetermined
Total	22	--

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board, and supplemented by information from Georgia State Department of Commerce.

Table C_{17}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	5	6	5,250
Secondary	2	2	1,700
No treatment	4	--	2,800

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{17}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	11	--	--	11
Textile mill products.....	1	--	--	1
Chemical and allied products................	10	--	--	10
Total.................	22	--	--	22

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the subbasin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{17}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	8	--	--	8	--	--	8
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{17}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{17}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	--	--	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	--	--	--
Undetermined	**12	9,750	22

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes one municipality with two primary plants.

Table H_{17}. Status of treatment works project* to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	--	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	**12	22

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

**Includes one municipality with two primary plants.

Table I_{17}. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

OCONEE RIVER SUB-BASIN

General Description

The Oconee River Sub-Basin, a rather long and narrow sub-basin, is bounded on the northeast by the Savannah, Ogeechee, and Altamaha River Sub-Basins, on the southwest by the Ocmulgee River Sub-Basin, and on the northwest by the Chattahoochee River Sub-Basin.

The river rises at the base of the Chattahoochee Ridge near Gainesville, Ga., at an elevation of about 1,000, feet and flows in a southeasterly direction across the Piedmont Plateau (Central Upland) into the Coastal Plain to its confluence with the Ocmulgee River in south central Georgia. The sub-basin lies entirely within the State of Georgia and comprises about 5,548 square miles. The river has a total length of 250 miles. The mean flow of the Oconee River at Mt. Vernon, Ga., is about 5,000 cubic feet per second. A minimum flow of 618 and a maximum flow of 67,000 cubic feet per second have been recorded at this gaging station.

The average annual rainfall varies from 48 inches in the southern part of the sub-basin to 50 inches in the northern part. The mean annual temperature varies from 62° F. to 65° F. depending on the latitude. The average number of days in the growing season is about 240.

The population of the sub-basin based on the 1940 census was 248,821. The preliminary 1950 census indicates the population to be 250,666.

Economic Development

There are eight urban communities in the sub-basin, an increase of two since 1940. These communities constitute 26 percent of the total population, an increase of seven percent since 1940. The rural population during this period has decreased by nine percent, while the total population has remained nearly constant.

The economy of the sub-basin is primarily one of agriculture. The farms of the region yield a variety of products including cotton, corn, tobacco, peanuts, vegetables, fruit and livestock.

Industries are related principally to the processing of agricultural and forest products. Most important of these are processers of food and kindred products, chemicals and allied products, textiles and paper, lumber, and the manufacture of brick and tile. Kaolin and clay are mined. Athens in the north and Dublin in the south are the principal commercial centers of the sub-basin.

Use of Water Resources

There are 27 public water supplies in the sub-basin serving a population of 66,765. Twelve of these are surface supplies serving 54,635 people.

There are three principal privately owned run-of-the-river water power developments in the sub-basin, the largest of which has a rated capacity of 2,800 kilowatts. A private project under construction at Furnan Shoals, Ga., will add a nominal rating of 45,000 kilowatts to the power supply of the sub-basin. Smaller water power plants ranging down to grist mill power, are scattered over the sub-

Table A_{18}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	16	41,090	Not applicable
Total	16	41,090	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

basin. The reservoirs supply a certain amount of sport fishing, but the main stem of the river is too muddy to be a good fishing stream.

The river is navigable to Milledgeville by means of a three-foot channel.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table B_{18}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	--	--
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	58	Undetermined
Total	58	--

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{18}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	6	7	5,640
Secondary	1	2	1,000
No treatment	9	—	34,450

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{18}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	24	--	--	24
Textile mill products.....	5	--	--	5
Paper and allied products.	1	--	--	1
Chemical and allied products....................	26	--	--	26
Miscellaneous.............	2	--	--	2
Total.................	58	--	--	58

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the sub-basin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{18}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	9	—	—	9	—	—	9
Industrial	—	—	—	—	—	—	—

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{18}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{18}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	—	—	—
Enlargement or additions to existing plant	—	—	—
Replace existing plant	—	—	—
No project required	—	—	—
Undetermined	**18	41,090	58

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes one municipality with two primary plants and one municipality with two secondary treatment plants.

Table H_{18}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	—	—
Abatement ordered	—	—
Plans under preparation	—	—
Final plans approved	—	—
Construction awaiting financing	—	—
Under construction	—	—
Status undetermined	**18	58

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

**Includes one municipality with two primary plants and one municipality with two secondary treatment plants.

Table I_{18}. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

OCMULGEE RIVER SUB-BASIN

General Description

The Ocmulgee River Sub-Basin is bounded on the northeast by the Oconee River Sub-Basin, on the southeast by the Altamaha and Satilla River Sub-Basins, on the southwest by the Suwannee and Flint River Sub-Basins, and on the northwest by the Chattahoochee River Sub-Basin.

The river rises at the base of the Chattahoochee Ridge in the Piedmont Plateau (central Upland) near Atlanta, Ga., at an elevation of about 1,000 feet, and flows in a generally southeasterly direction for about 240 miles and then in a northeasterly direction to its confluence with the Oconee River in the Coastal Plain in south central Georgia. The sub-basin lies entirely within the State of Georgia and comprises about 5,909 square miles. The river has a total length of 315 miles. The mean flow of the Oconee at Lumber City, Ga., is about 5,000 cubic feet per second. A minimum flow of 1,310 cubic feet per second has been recorded at this gaging station.

The average annual rainfall varies from 47 inches in the lower part of the sub-basin to 50 inches in the northern part. The mean annual temperature varies from 63°F. to 66° F. The growing season averages 240 days.

The population of the sub-basin based on the 1940 census was 459,000. The preliminary 1950 census indicates the population to be 535,800.

Economic Development

There are 13 urban municipalities entirely within the sub-basin and parts of three others whose urban populations constitute 49 percent of the total. The largest of these three is Atlanta, which is principally in the Chattahoochee River Sub-Basin. Macon, a city of 70,106, is the largest city entirely within the Ocmulgee River Sub-Basin and is an industrial and railroad center and a trading center for a large agricultural area.

The sub-basin is one of combined industry and agriculture. Industries are related primarily to the processing of agricultural and forest products and concern chiefly the manufacture of chemicals and allied products, food and kindred products, furniture, and textile mill products. Two paper and allied product mills are located in the sub-basin, both at Macon. Kaolin and mica are mined and granite is quarried.

The farms of the sub-basin yield a large variety of products including cotton, corn, tobacco, peanuts, vegetables, fruit and livestock.

Use of Water Resources

There are 38 public water supplies in the sub-basin serving a population of 129,847. Nine of these are from surface sources and serve 104,685 people.

There are five privately-owned water power developments located on the river and its tributaries with a station rating of 500 kilowatts or larger. All are comparatively small run-of-the-river plants, except the Loyd Shoals (Jackson Reservoir) plant which has a rated capacity of 14,400 kilowatts. Smaller water power plants, ranging down to small

Table A_{19}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	—	—
Having population data available (Data on pollution load to watercourse incomplete or not available)	27	189,700	Not applicable
Total	***29	189,700	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes two college sewerage systems with no population served figures available.

grist mill power, are scattered over the sub-basin. The reservoirs provide a certain amount of sport fishing, boating and swimming.

The river is navigable to Macon by means of a three-foot channel.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table B_{19}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	—	—
Producing organic wastes	—	Undetermined
Producing inorganic wastes	—	Not applicable
Producing wastes of undetermined type	74	Undetermined
Total	74	—

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{19}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	9	9	7,900
Secondary	7	9	88,900
No treatment	**14	—	92,900

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one municipality also listed under primary treatment.

Table D_{19}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	24	—	—	24
Textile mill products......	12	—	—	12
Lumber and wood products...	1	—	—	1
Paper and allied products..	2	—	—	2
Chemical and allied products.............	30	—	—	30
Products of petroleum and coal.............	2	—	—	2
Leather and leather products.............	2	—	—	2
Miscellaneous..............	1	—	—	1
Total..................	74	—	—	74

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the sub-basin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{19}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	18	—	—	18	—	—	18
Industrial	—	—	—	—	—	—	—

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{19}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	1	3,000	0	—
1949	0	—	0	—

Table G_{19}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	—	—	—
Enlargement or additions to existing plant	—	—	—
Replace existing plant	—	—	—
No project required	—	—	—
Undetermined	**32	—	74

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes two municipalities with multiple outlets.

Table H_{19}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	—	—
Abatement ordered	—	—
Plans under preparation	—	—
Final plans approved	—	—
Construction awaiting financing	—	—
Under construction	—	—
Status undetermined	**32	74

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

**Includes two municipalities with multiple outlets.

Table I_{19}. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

ALTAMAHA RIVER SUB-BASIN

General Description

The Altamaha River Sub-Basin is bounded on the north and northeast by the Ogeechee River Sub-Basin, on the east by the Atlantic Ocean, on the south by the Satilla River Sub-Basin, and on the west by the Ocmulgee and Oconee River Sub-Basins.

The Altamaha River is formed in south central Georgia by the confluence of the Ocmulgee and Oconee Rivers. From this point, which is known as The Forks, it flows easterly for 30 miles and then southeast for 107 miles to its delta outlets into Doboy Sound and Altamaha Sound. The area of the sub-basin, which lies entirely within the State of Georgia, comprises about 2,691 square miles.

The sub-basin lies entirely within the Coastal Plain and meanders through a comparatively broad and shallow valley. The river is tidal for about 33 miles above its mouth. The average low water slope of the river in the non-tidal section is 0.67 feet per mile. The flood plain varies in width from 1 mile to 4 1/2 miles. The mean flow of the Altamaha at Doctortown, Ga., 59.4 miles above the mouth, is about 12,500 cubic feet per second. A low flow of 1,760 cubic feet per second has been recorded at this gaging station.

The average annual rainfall varies from about 47 inches at The Forks to nearly 50 inches near the coast. Precipitation is fairly uniform. Floods occur occasionally and hurricanes pass over the area at times.

The mean annual temperature varies from about 65° F. in the northern part of the sub-basin to 69° F. near the coast. The average frost free season varies from 250 to 280 days.

The population of the sub-basin was 83,371 based on the 1940 census. The preliminary 1950 census indicates that the population has decreased by four percent to 79,667.

Economic Development

There are four urban communities in the sub-basin whose combined populations constitute 22 percent of the total. The largest of these is Vidalia which has a population of 5,827. The rural population has decreased by 15 percent since 1940.

The principal resources of the sub-basin are its agricultural lands, an abundant timber supply from the swamps lying along the river, and naval stores. Agricultural products include cotton, corn, tobacco, and livestock.

Use of Water Resources

There are sixteen public water supplies in the sub-basin serving 19,100 people. None are from surface sources. No hydroelectric developments exist on the river at present although investigations have indicated the possibility of a project for power, flood control, and navigation at river mile 88.6.

Transportation on the river is slight, being limited at present to the hauling of logs.

The primary utilization of the surface water resources of the sub-basin are for recreation and the propagation of fish and wildlife. The river provides some of the finest sport fishing in the State and in addition supports a small

Table A_{20}. Sources of pollution, municipal

Municipal-ities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to water-course (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	9	11,860	Not applicable
Total	9	11,860	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

amount of commercial fishing. The extensive forested swamps bordering much of the stream make this area a haven for ducks, wild turkeys, deer and other wildlife and provide for good hunting. No public recreational areas have been developed in the area.

Table B_{20}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	—	—
Producing organic wastes	—	Undetermined
Producing inorganic wastes	—	Not applicable
Producing wastes of undetermined type	21	Undetermined
Total	21	—

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board, and supplemented by information from the Georgia State Department of Commerce.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table C_{20}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	9	13	11,860
Secondary	0	—	—
No treatment	0	—	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{20}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	9	—	—	9
Chemical and allied products.................	12	—	—	12
Total..................	21	—	—	21

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the sub-basin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{20}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	13	--	--	13	--	--	13
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{20}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{20}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	--	--	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	--	--	--
Undetermined	13	11,860	21

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

Table H_{20}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	--	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	13	21

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I$_{20}$. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

SATILLA RIVER SUB-BASIN

General Description

The Satilla River Sub-Basin is bounded on the north by the Altamaha River Sub-Basin, on the east by the Atlantic Ocean, on the south by the St. Marys-Nassau River Sub-Basin, on the south and west by the Suwannee River Sub-Basin, and on the northwest by the Ocmulgee River Sub-Basin. The river rises in south central Georgia and flows in a general easterly direction to St. Andrews Sound.

This river rises in the Coastal Plain and flows through a rather flat sandy area interspersed with swamps. It is consequently relatively clear. The sub-basin, which lies entirely within the State of Georgia, comprises about 4,276 square miles. The upland portions consist of pine forests and farm land.

The climate of the sub-basin is relatively hot and moist. The mean annual temperature varies from 67°F. to 69°F. The annual average rainfall varies from 48 inches inland to over 50 inches at the coast. The frost free growing season varies from 250 to 280 days. Much of the rainfall occurs in the long, warm, growing season, which encourages timber growth.

A ten-year record of the river gaging station at Atkinson, Ga., where the drainage area is 2,880 square miles, shows a twenty-four hour maximum discharge of 17,000 cubic feet per second, a twenty-four hour minimum discharge of 4.5 cubic feet per second, and a mean daily discharge of 1,534 cubic feet per second.

The population of the sub-basin according to the census of 1940 was 124,607. The 1950 preliminary census indicates the population to be 134,409.

Economic Development

There are five urban communities in the sub-basin having a combined population of 50,398, or 37 percent of the total population. The largest of these are Waycross, a farming and industrial center of 18,842 people, and Brunswick, a coastal industrial city of 18,086 population.

The economy of the sub-basin is one of combined agriculture and industry. Principal agricultural products are tobacco, peanuts, corn, cattle and hogs, pecans, and products of the forest.

Industry centers around the processing of food, naval stores, and the manufacture of wood products and lumber. The Atlantic Coast Line Railroad shops are located at Waycross.

Brunswick harbors a fishing fleet and processes sea foods. Ship yards and repair facilities, naval stores plants, and a paper pulp plant are also located there.

Use of Water Resources

There are 12 public water supplies in the sub-basin serving a population of 30,640. None of these are from surface sources.

The Satilla River system provides good fresh water sport fishing, and the numerous swamps and forest land support abundant wild game.

Excellent beaches exist at St. Simons Island and at Jekyll Island near Brunswick and extensive recreational facilities have been developed

Table A_{21}. Sources of pollution, industrial*

Municipal-ities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	—	—
Having population data available (Data on pollution load to watercourse incomplete or not available)	8	37,700	Not applicable
Total	8	37,700	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

there. Salt water sport fishing, boating and swimming are popular activities.

The sounds along the coast support a commercial fishery of high value. Shrimp are probably the largest money catch, but crabs, food fishes, and oysters are also important.

The Intracoastal Waterway passes through the area, and shipping is of some importance at Brunswick.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table B_{21}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	--	--
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	38	Undetermined
Total	38	--

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{21}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	3	3	6,200
Secondary	0	0	0
No treatment	5	--	31,500

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary wastes directly to watercourse.

Table D_{21}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	15	--	--	15
Paper and allied products..	1	--	--	1
Chemical and allied products..................	19	--	--	19
Products of petroleum and coal................	3	--	--	3
Total.................	38	--	--	38

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the sub-basin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{21}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	3	—	—	3	—	—	3
Industrial	—	—	—	—	—	—	—

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{21}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{21}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	--	--	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	--	--	--
Undetermined	8	37,700	38

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

Table H_{21}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	--	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	8	38

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{21}. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

ST. MARYS-NASSAU RIVER SUB-BASIN

General Description

The St. Marys-Nassau River Sub-Basin is bounded on the north by the Satilla River Sub-Basin, on the east by the Atlantic Ocean and St. Johns River Sub-Basin, and on the south and west by the Suwannee River Sub-Basin. The St. Marys River rises along the edges of the Okefenokee Swamp of South Georgia, and forms the State line between Florida and Georgia to its mouth at Fernandina. The Nassau River rises northwest of Jacksonville, Fla. and is entirely in Florida, flowing east to the ocean about 15 miles south of Fernandina. It is more of an estuary than a fresh water stream.

The two river sub-basins comprise an area of about 1,957 square miles, of which 1,362 are in Florida and 595 are in Georgia. The entire area consists of typical flat pine land and sand soil, with an occasional stream.

The climate of the area is mild, the average annual temperature for the sub-basin being about 69° F. Average annual rainfall varies from 48 inches along the coast to 51 inches in the western part of the sub-basin. Average discharge of the St. Marys River indicates a run-off-of approximately 0.8 cubic feet per second per square mile.

The population of the sub-basin was 27,175 in 1940. The preliminary 1950 census reports indicate a population of 36,087.

Economic Development

Fernandina, Fla. is the only urban community in the sub-basin. In 1940 its population was about 16 percent of the total of the sub-basin, but according to the preliminary 1950 census this urban center constitutes only 14 percent of the total population.

Agriculture in the area consists primarily of development of pine woodland for the pulp and paper industry and naval stores.

The chief industry of the area is the production of paper. There are three large paper mills, at St. Marys, Ga., on the St. Marys River, and the others are at Fernandina, Fla. Other industries in the area include naval stores, shrimp canning plants, and a fish oil and fertilizer producing plant, which uses the pogie as a source of oil and the scraps of the fish for fertilizer. There is also a phosphate rock loading dock, which takes advantage of the very deep harbor at Fernandina.

Use of Water Resources

There are five public water supplies in the sub-basin serving 6,800 people. None of these is from surface sources. Surface water resources of the area are primarily used for production of seafood in the tidal waters and navigation in the harbor and Intracoastal Waterway. The fresh water streams are also quite heavily fished for recreational purposes and the area is abundant in wildlife and waterfowl.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution existing treatment facilities and treatment plant requirements are shown in tables A_{22} to I_{22}, inclusive.[7]

There are three municipal sources of pollution having a combined sewered population of 1,450. The amount of pollution discharged by these sources is undetermined.

Two industries in Georgia that are of a type normally considered to discharge wastes with pollution characteristics, but which may or may not discharge directly to a watercourse, and four in Florida are located within the sub-basin. One Florida industry producing organic wastes discharges a major portion of its wastes to the sea. It also discharges waste with a population equivalent of more than 100,000 directly to inland waters. The amount of pollution from the remaining three industries in Florida producing organic wastes remains undetermined.

One municipality has a primary treatment plant serving a population of 500, and a second has secondary treatment serving 200 people. Both of these plants are adequate with relation to capacity and operation. Existing industrial waste treatment facilities in the sub-basin are undetermined.

There were no municipal or industrial treatment plants constructed in the sub-basin during the period 1946 through 1949. A special act of the Florida Legislature exempts industries of Nassau County from rules and regulations of the Florida Board of Health regarding pollution of the State's watercourses.

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[7] Data for portion of sub-basin in Georgia are incomplete. See Savannah River Sub-Basin Report for discussion of sources from which water pollution data for Georgia have been obtained.

Requirements for abatement of municipal pollution in the sub-basin are three new plants to serve a population of 1,985. This includes two municipalities that need complete sewerage systems. The requirements for waste treatment at six industrial establishments is undetermined.

Final plans have been approved for a treatment plant at one municipality and the status of projects at two municipalities and six industries is undetermined.

Table A_{22}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	3	1,450	Not applicable
Total	3***	1,450	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Does not include two municipalities in Florida, having a combined population of 1,235, which require complete sewerage systems.

Table B_{22}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	**100,000
Producing organic wastes	3	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	***2	Undetermined
Total	6	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Represents only a small portion of waste from this plant, the major portion of which is discharged to the ocean.

***Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{22}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	1	1	500
Secondary	1	**1	200
No treatment	1	--	750

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Sub-surface tile field.

Table D_{22}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	1	--	--	1
Paper and allied products..	3	--	--	3
Chemical..................	2	--	--	2
Total.................	6	--	--	6**

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes 2 industries in Georgia that are of a type normally considered to discharge wastes with pollution characteristics but which may or may not discharge directly to watercourse.

Table E_{22}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	2	2	0	0	2	0	0
Industrial	--	--	--	--	--	--	--

Table F_{22}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{22}. Requirements for municipal and industrial waste treatment plants*+

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**3	1,985	--
Enlargement or additions to existing plant	0	--	--
Replace existing plant	0	--	--
No project required	2	700	--
Undetermined	0	--	6

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes two Florida municipalities that need complete sewerage systems.

+The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

Table H_{22}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	0	--
Abatement ordered	0	--
Plans under preparation	0	--
Final plans approved	1	--
Construction awaiting financing	0	--
Under construction	0	--
Status undetermined*	2	6

*The Georgia Water Pollution Control Agency had furnished no information as to status of requirements.

Table I_{22}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Callahan	685	Sewers and treatment	No municipal sewers
Fernandina	750	New plant	--
Rendering plants	Not known	Two undetermined	--
Pulp mills	Not known	Two undetermined	--
Hilliard	550	Sewers and treatment	No municipal sewers

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

**Population equivalent for industry.

ST. JOHNS RIVER SUB-BASIN

General Description

The St. Johns River Sub-Basin comprises an area of 7,612 square miles entirely within the State of Florida. The sub-basin is bounded on the north and northwest by the St. Marys-Nassau River Sub-Basin, on the east by the Atlantic Ocean and Florida East Coastal Area, on the south by the Kissimmee River Sub-Basin, and on the west by the Suwannee and Withlacoochee River Sub-Basins.

The river rises in the great grassy plain lying about 25 miles inland from the east coast of Florida, and flows north through a series of lakes, to the vicinity of Jacksonville, thence east into the Atlantic Ocean at Mayport. The topography of the area in general is flat. Relatively high banks exist along some stretches of the river and tidal effect is felt for about 100 miles above its mouth.

The mean annual rainfall in the sub-basin varies from about 50 inches in the north to 52 inches at Orlando. A 13-year record of the U. S. Geological Survey gauge near Deland, Fla., above the tidal effect in the stream shows the average discharge to be 2,904 cubic feet per second, the maximum discharge of 14,400 cubic feet per second and a minimum of ten cubic feet per second.

Mean annual temperatures vary from 69°F. in the north to 72°F. in the southern part of the sub-basin.

In 1940 the population of the sub-basin was 418,500. The preliminary 1950 census indicates a sub-basin population of 580,700 representing an increase of 39 percent during the past decade.

Economic Development

The sub-basin contains 14 urban communities, comprising 61 percent of the total population. The largest of these is Jacksonville having an estimated population of about 200,000. During the winter months an increase in population is experienced due to the tourist trade.

The sub-basin is one of combined agricultural and industrial economy. In its upper regions the Ocklawaha River, principal tributary of the St. Johns, drains some of the richest citrus growing areas in the State. The headwaters of the St. Johns River drain thousands of acres of grassy pasture land for beef cattle raising. This sub-basin is part of the area which has enabled Florida to become one of the leading cattle producing States of the union.

Principal industries in the sub-basin are processing of food and kindred products, and the manufacture of paper and allied products and chemicals.

Use of Water Resources

Surface water resources are used primarily for livestock watering, maintenance of ground water levels throughout the agricultural area, and fishing and navigation on the St. Johns River. Maintenance of ground water levels is considered one of the major uses and control structures are in operation on a number of the lakes and streams within the sub-basin.

There are 86 public water supplies in the St. Johns River Sub-Basin serving 470,778 people. The supply at Palatka serving a population of 7,500 and that at Bellview, serving 630 people, are the only ones derived from surface waters. The domestic water supply of Orlando is derived partly from surface supplies and partly from wells.

Recreational activities on the rivers of the sub-basin are limited almost entirely to sports fishing and hunting of water fowl. There are some bathing, boating, and water skiing activities on the lakes in the Orlando-Winter Park area.

Pollution and Pollution Control

There are some grossly polluted streams in the St. Johns River Sub-Basin that in general can be recovered easily for normal water uses.

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{23} to I_{23}, inclusive.

Twenty-nine municipalities having a sewered population of 290,441 discharge pollution to the streams and lakes of the sub-basin. Six of these (with sixty-two percent of the total population) do not treat their sewage, fifteen have primary treatment plants and eight have secondary treatment facilities.

There are twenty-nine industries in the sub-basin discharging organic wastes directly to watercourses, one of these also produces inorganic wastes. The waste treatment facilities provided by these industries and the amount of pollution discharged in terms of equivalent number of people are undetermined.

Eleven of the 23 existing municipal sewage treatment plants are of satisfactory design capacity and 13 are satisfactorily operated.

Four new municipal sewage treatment plants, serving 17,440 persons, and one industrial plant were constructed during 1948.

Requirements for abatement of municipal pollution in the sub-basin consist of 13 new treatment plants to serve 193,151, additions to two existing plants serving 17,500, and replacement of one plant to serve a population of 300. No project is required at 12 municipalities and the requirements at 29 industrial establishments are undetermined.

Plans for three municipal plants are under preparation. The status of treatment works projects at seven municipalities and 29 industries is undetermined.

Table A_{23}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	29	290,441	Not applicable
Total	29	290,441	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{23}. Sources of pollution, industrial

Industries *	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	29	Undetermined
Producing inorganic wastes	**1	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***29	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Included also under organic wastes.

***Total adjusted to correct for duplication noted in footnote marked, **.

Table C_{23}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	15	15	36,051
Secondary	8	8	69,990
No treatment	6	--	184,600

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{23}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	20	—	—	20
Paper and allied products..	2	—	—	2
Chemical and allied products..................	5	—	—	5
Products of petroleum and coal.....................	1	—	—	1
Miscellaneous..............	1	—	—	1
Total..................	29	—	—	29

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{23}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	23	11	11	*1	13	9	1
Industrial	—	—	—	—	—	—	—

*Data are not available as to capacity, operation, and project requirements for Jacksonville Naval Air Station.

Table F_{23}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	4	17,440	1	—
1949	0	—	0	—

Table G_{23}. Requirements for municipal and industrial waste treatment plants

Requirements*	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**13	193,151	--
Enlargement or additions to existing plant	2	17,500	--
Replace existing plant	***1	300	--
No project required	[1]12	79,490	--
Undetermined	[2]1	--	29

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions, eight municipalities with plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements.

***One plant, now satisfactory as to adequacy, requires a replacement because of forseeable overloadings in the near future.

[1] One municipality with a plant classified as unsatisfactory has been considered as requiring no project since the disposal of its wastes is satisfactory at the present time.

[2] Data are not available as to capacity, operation or project requirements for Jacksonville Air Base.

Table H_{23}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	7	--
Abatement ordered	--	--
Plans under preparation	3	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	7	29

Table I_{23}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Clay County:			
Soap plant	Not known	Undetermined	—
Clearmont:			
Citrus processing plant	Not known	Undetermined	—
Crescent City	300	Replacement of existing plant	—
Deland:			
Citrus processing plant	Not known	Undetermined	—
East Palatka	1,000	New plant	—
Eustis	2,500	New plant	Plans under preparation
Gainesville	14,000	Addition to existing plant	Plans under preparation
Citrus processing plant	Not known	Undetermined	—
Gardenia Farms:			
Rendering plant	Not known	Undetermined	—
Green Cove Springs	1,500	New plant	—
Groveland:			
Citrus cannery	Not known	Undetermined	—
Hastings	815	New plant	—
Jacksonville	170,000	New plant	—
Brewery	Not known	Undetermined	—
Chemical industries	Not known	Undetermined (3)	—
Dairies	Not known	Undetermined (2)	—
Miscellaneous industries	Not known	Undetermined (2)	—
Meat packing plants	Not known	Undetermined (3)	—
Paper and allied products industries	Not known	Undetermined	—
Shortening manufacturing plant	Not known	Undetermined	—
Leesburg	3,500	Additions to existing plant	—
Citrus processing plant	Not known	Undetermined	—
Mayport	511	New plant	—
Mt. Dora	600	New plant	Plans under preparation
Naval Air Station (Jacksonville)	Not known	Undetermined	—
Neptune Beach	2,430	New plant	—
Citrus processing plant	Not known	Undetermined	—
Orange Park	300	New plant	—
Orlando:			
Brewery	Not known	Undetermined	—
Citrus processing plant	Not known	Undetermined (2)	—
Dairy	Not known	Undetermined	—
Palatka	4,800	New plant	—
Paper and allied products industries	Not known	Undetermined	—
Plymouth:			
Citrus processing plant	Not known	Undetermined	—
Sanford	7,000	New plant	—
Slavia:			
Meat packing plant	Not known	Undetermined	—
Umatilla	350	New plant	—
Wildwood	1,345	New plant	—
Winter Garden:			
Citrus processing plant	Not known	Undetermined	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

SUWANNEE RIVER SUB-BASIN

General Description

The Suwannee River Sub-Basin is bounded on the north by the Ocmulgee and Satilla River Sub-Basins, on the east by the St. Marys-Nassau, St. Johns and Withlacoochee River Sub-Basins, on the southwest by the Gulf of Mexico and Ochlockonee-St. Marks River Sub-Basin and on the west by the Flint River Sub-Basin. The Suwannee River rises in the Okefenokee Swamp of southeast Georgia, but three principal tributaries, the Alapaha, Withlacoochee and Little Rivers have their head-waters in south central Georgia. The sub-basin contains about 9,941 square miles, of which 5,546 are in Georgia and 4,395 are in Florida.

The Suwannee flows in a very meandering course from Georgia across Florida, entering the Gulf of Mexico just south of Cross City. Practically all of the drainage area is relatively flat with light sandy soil in the south central portion, giving way to gently rolling hills and some clay in the northern section of the area. The lower part of the sub-basin is characterized by outcroppings of lime rock near or on the surface of the ground and both the Suwannee and Santa Fe Rivers, a major tributary in Florida flow through cuts in the limestone formation. There are numerous springs along the banks of rivers in the sub-basin, which add to the surface run-off. In Florida, the largest of these springs are: Worthington Springs, Big Putnam Springs and Fanning Springs.

Mean annual temperatures throughout the sub-basin range from 69°F. to 71°F. Frosts in the area are infrequent. Rainfall is relatively even throughout the sub-basin averaging about 53 inches per year. A fifteen-year record at the U.S. Geological Survey gauge near the mouth of the Suwannee River at Bell, Fla. shows the minimum discharge during the period to be 2,790 cubic feet per second. The average discharge for the same period was 8,283 cubic feet per second.

The 1940 population of the sub-basin was 283,700 and the 1950 preliminary census indicates a population of 290,100.

Economic Development

There are 14 urban communities in the sub-basin, of which ten are in Georgia, and four in Florida. The urban population based on the 1950 preliminary census report is 83,353, approximately 29 percent of the total population of the sub-basin.

The farm products in the Florida portion consist of corn, tobacco, peanuts and cotton. Rows of pecan and tung oil trees are prominent throughout the area.

The principal industries are those connected with the extensive forests and food processing. The naval stores industry is particularly important throughout the sub-basin.

Use of Water Resources

There are 49 public water supplies in the sub-basin, about equally divided between Georgia and Florida. These supplies, all derived from ground waters, serve a population of 84,810.

The streams of the sub-basin are considered good sport fishing waters and there is some commercial fishing near the Gulf. In general, the streams are also attractive scenically, which adds to their recreational value. An abundance of wildlife and water fowl are found throughout the sub-basin from the Okefenokee Swamp to the Gulf of Mexico.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{24} through I_{24}, inclusive. The Georgia Water Pollution Control Agency has not furnished the Southeast Drainage Basins Office complete information on pollution and pollution control in that part of this sub-basin which lies in the State of Georgia. The incomplete data for the Georgia municipalities and industries presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

There are twenty municipal sources of pollution in the sub-basin having a combined sewered population of 49,275. Seventy industries of a type normally considered to discharge wastes with pollution characteristics, which may or may not have separate outlets to watercourses discharge wastes of an undetermined type and amount.

Fourteen municipalities have 15 primary sewage treatment plants serving a combined population of 28,675. Two municipalities have secondary treatment plants with a connected population of 6,400. No treatment is provided for the sewage from 14,200 people at five municipalities.

Treatment facilities of industrial establishments in the sub-basin are undetermined. Of the seventeen municipal sewage treatment plants the capacity of eight is reported to be adequate with relation to capacity, and the remainder are undetermined. Adequacy with relation to operation of two municipal plants is satisfactory, six unsatisfactory, and nine undetermined.

No municipal or industrial waste treatment plants were constructed in the sub-basin during the period 1946 through 1949. Known requirements for the abatement of pollution are ten new plants to serve a population of 11,391, enlargement or addition of one municipal plant serving a population of 4,000 and the requirements at 13 municipalities and 70 industries are undetermined.

One municipal sewage treatment plant is under construction. Plans are under preparation at one municipality and abatement of pollution has been ordered at a third. No formal action has been taken with three municipalities in regard to treatment of their sewage. The status of treatment works projects to abate pollution at 18 municipalities and 70 industries remains undetermined.

Table A_{24}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	20	49,275	Not applicable
Total	***20	49,275	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries, discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Does not include three Florida municipalities, having a total population of 3,266, that need complete sewerage systems.

Table B_{24}. Sources of pollution, industrial

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	--	--
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	*70	Undetermined
Total	70	--

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{24}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipal-ities*	Plants	
Primary	**4	***15	28,675
Secondary	2	2	6,400
No treatment	[1]5	--	14,200

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in secondary treatment.

*** 1 effluent discharged to ground water;
1 effluent discharged to surface water of undetermined drainage.

[1] Does not include three municipalities that need complete sewerage systems.

Table D_{24}. Existing treatment facilities, industrial

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	22	--	--	22
Textile mill products.....	3	--	--	3
Chemical and allied products...............	44	--	--	44
Miscellaneous.............	1	--	--	1
Total.................	70	--	--	70*

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets.

Table E_{24}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	17	--	8	9	2	6	9
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to the adequacy of plants with relation to capacity or operation.

Table F_{24}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{24}. Requirements for municipal and industrial waste treatment plants*+

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**10	11,391	--
Enlargement or additions to existing plant	1	4,000	--
Replace existing plant	--	--	--
No project required	***1	4,000	--
Undetermined	[1]13	33,150	70

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes three Florida municipalities having a total population of 3,266 that need complete sewerage systems. Due to local conditions six municipalities with plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements.

***One municipality with a plant classified as unsatisfactory has been considered as requiring no project, since the disposal of its waste is satisfactory at the present time.

[1] Includes four municipalities having no treatment.

Table H_{24}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	3	--
Abatement ordered	1	--
Plans under preparation	1	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	1	--
Status undetermined*	18	70

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{24}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served	Project requirements	Remarks
FLORIDA			
Branford	1,616	Sewers and treatment	No municipal sewers
Jasper	1,200	New plant	--
Lake Butler	275	New plant	--
Lake City	4,000	Enlarge plant	Under construction
Live Oak	2,000	New plant	Abatement ordered
Madison	1,600	New plant	Plans under preparation
Mayo	877	Sewers and treatment	No municipal sewers
Raiford (Prison)	2,250	New plant	--
Trenton	773	Sewers and treatment	No municipal sewers
Waldo	500	New plant	--
White Springs	300	New plant	--

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*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

OCHLOCKONEE-ST. MARKS RIVER SUB-BASIN

General Description

The Ochlockonee-St. Marks River Sub-Basin is bounded by the Suwannee River Sub-Basin on the east, the Flint River Sub-Basin on the northwest, the Apalachicola River Sub-Basin on the west, and by the Gulf of Mexico on the south. There are approximately 6,658 square miles contained by the sub-basin, of which 5,078 square miles lie in Florida and 1,580 square miles in Georgia. The three principal streams of the sub-basin are the Ochlockonee and Aucilla Rivers which have headwaters in southern Georgia, and the St. Marks which has its source at Lake Lafayette, about ten miles east of Tallahassee. Each of these rivers drains to the Gulf of Mexico, the Ochlockonee entering at Apalachee Bay, the Aucilla at Monticello, and the St. Marks at St. Marks. There are a number of smaller streams and tributaries in the sub-basin, the more important being, from west to east, the New River, Wacissa River, Econfina River, and Fenholloway River.

Topographical features of the sub-basin are not prominent, the northern section having low rolling hills, with very flat coastal plains near the Gulf. Much of the coastal plain area consists of nearly impenetrable swampland, particularly near the streams.

Rainfall in the sub-basin varies from about 48 inches in the northern, or Georgia part of the sub-basin, to approximately 56 inches along the coast.

Precipitation is fairly uniform throughout most of the year, the highest monthly averages being recorded during the months of June through September.

The Ochlockonee is the largest stream of the sub-basin having an average annual flow of 1,582 cubic feet per second, varying from a maximum of 19,900 cubic feet per second to a minimum of practically no flow.[8]

Average yearly temperatures vary from about 65°F. in the north part to 67°F. in the south central Florida area. Frost free days average about 250 days in the Georgia portion to 280 days in Florida.

Economic Development

The estimated 1940 population of the sub-basin was 166,787, of which 26 percent was urban. The preliminary 1950 census indicates a total of 184,709 persons of which 33 percent are urban. The urban population is contained in six municipalities, of which three are in Florida and three in Georgia.

The largest proportion of the population of the sub-basin is engaged in agriculture. Principal crops are corn, cotton, peanuts and tobacco. Richest farm land of the area is probably in the vicinity of Quincy, Fla., which is noted for shade tobacco production. A few communities along the Florida coast are commercial fishing centers. The coastal lands are composed largely of sparsely settled forested swamp areas which grow saw timber and pulp wood. Several large lumber mills are located at Perry, Fla.

Coastal cities, chief of which are Carrabelle, Panacea, St. Marks, St. Theresa and Wakulla, are centers of tourist attraction.

Industries in the sub-basin area are primarily those related to food processing, and chemical and allied industries. There are also some lumber mills and textile plants in the area.

Use of Water Resources

There are a total of 31 municipal water supplies in the sub-basin area, 30 of which are from ground waters and serve a total of 56,500 people. One surface supply serves a population of 5,500.

The waters of the sub-basin, both fresh and salt, are noted as sport fishing grounds. Commercial fishing flourishes along the Gulf coast at Corrabelle, St. Marks, and Panacea. The streams are not generally popular for bathing, although boating is practiced extensively. The nature of the streams is mostly slow-moving and meandering. In Florida, they are usually highly colored from coursing through cypress swamps.

There are no major power developments of the streams in the area.

The chief port of shipping is St. Marks, Fla., with Carrabelle and Panacea next in importance. There is no noteworthy inland navigation.

Pollution and Pollution Control

Available data regarding sources of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{25} to I_{25}, inclusive. The Georgia Water Pollution Control Agency has not furnished the Southeast Drainage Basins Office complete information on pollution control in that part of this sub-basin which lies in the State of Georgia. The incomplete data for the Georgia municipalities and industries presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

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[8] Data of U. S. Geological Survey for a 21-year average.

Twelve municipalities with a sewered population of 52,300 discharge sewage to watercourses of the sub-basin. Forty-five industries which normally are considered to discharge wastes with polluting characteristics and which may or may not have separate outlets are located in the sub-basin. One industry located in Florida produces organic wastes for which the amount of pollution is undetermined. The types and amounts of pollution discharged by the 44 industries located in Georgia have not been supplied to this office by the Georgia Water Pollution Control Agency.

Six municipalities serving 6,700 persons have six primary treatment plants. Four having five plants providing secondary treatment serve 44,200 persons; and two municipalities with a sewered population of 1,400 have no treatment. In Florida the adequacy of design capacity of three plants is satisfactory and three unsatisfactory; operation is considered satisfactory at two plants and unsatisfactory at four. Data regarding adequacy of treatment of municipal and industrial wastes for the Georgia portion of the sub-basin have not been supplied this office. During the period 1946-1949 one treatment plant for municipal wastes has been completed. No industrial waste treatment plants have been completed during this period.

The status of treatment works projects to abate pollution in Georgia has not been furnished for use in this report by the Georgia Water Pollution Control Agency. It is reported that six new plants are required in Florida. Plans are under preparation at one of these municipalities. No formal action has been taken with the remaining cities.

Table A_{25}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	12	52,300	Not applicable
Total	12	52,300	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{25}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people.)
Producing organic wastes	--	--
Producing organic wastes	1	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	**44	Undetermined
Total	45	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{25}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	6	6	6,700
Secondary	4	**5	44,200
No treatment	***2	--	1,400

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Effluent of two Florida plants discharge to surface waters with undetermined drainage.

***Does not include one Florida municipality having a population of 1,819 which is in need of a complete sewerage system.

Table D_{25}. Existing treatment facilities, industrial

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.................	24	--	--	24
Textile mill products......	1	--	--	1
Chemical and allied products.................	19	--	--	19
Miscellaneous..............	1	--	--	1
Total..................	45	--	--	*45

*Industries (only those types normally considered to discharge wastes with polluting characteristics), 44 of which are located in the Georgia portion of the sub-basin, which may or may not have separate outlets.

Table E_{25}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	11	3	3	5	2	4	5
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

Table F_{25}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	1	35,000	0	--

Table G_{25}. Requirements for municipal and industrial waste treatment plants*+

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**6	8,219	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	3	24,500	--
Undetermined	5	21,400	45

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes one Florida municipality that needs a complete sewerage system.

Table H_{25}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	2	--
Abatement ordered	--	--
Plans under preparation	1	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	8	45

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{25}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Cross City......................	1,819	Sewers and treatment	No municipal sewers
Foley...........................	200	New plant	--
Havana..........................	200	New plant	--
Monticello......................	1,500	New plant	--
Perry...........................	1,200	New plant	--
Quincy..........................	3,300	New plant	--
Tallahassee:			
Meat packing plant..........	Not known	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

**Population equivalent for industry.

WITHLACOOCHEE RIVER SUB-BASIN

General Description

The Withlacoochee River Sub-Basin lies entirely in Florida. It is bounded on the northeast and east by the St. Johns and Kissimmee River Sub-Basins, on the south by the Peace River Sub-Basin, on the southwest by the Tampa Bay Area and Gulf of Mexico, and on the northwest by the Suwannee River Sub-Basin.

The river originates in a large flat grassland in the central part of the State and meanders sluggishly through heavily wooded swamps and open grasslands in a general northwesterly direction to the Gulf of Mexico.

The area of the sub-basin is about 3,504 square miles. The average annual rainfall varies with location from 45 inches to 53 inches. A 16-year record of the U.S. Geological Survey gauge at Holder, Fla., where the watershed area is 1,590 square miles, shows the average discharge to be 1,060 cubic feet per second. The maximum discharge at this point was 6,740 cubic feet per second, and the minimum was 144 cubic feet per second.

The mean annual temperature of this area varies from 70°F. to 73°F. The number of days without killing frosts varies annually from 310 to 365.

The total population of the sub-basin in 1940 was 58,773. The preliminary 1950 census reports indicate a population increase to 68,609.

Economic Development

The sub-basin contains only one urban community which comprises six percent of the population.

The growing of citrus fruit and the related industries of packing, canning, and the processing of pulp for stock food and molasses are the chief sources of income in the sub-basin.

Use of Water Resources

There are 15 public water supplies in the sub-basin, all from ground water sources.

There are considerable fish and wildlife resources in the Withlacoochee Sub-Basin and it is a popular fishing territory. Little other recreational use is made of the stream because it is too shallow during much of the year. Also, much of the stream is practically inaccessible.

The river is used to some extent for irrigation and there is a single small hydroelectric plant located at Inglis.

There is commercial fishing and shellfish gathering at Cedar Key off the coast.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in table A_{26} through I_{26}, inclusive.

Five municipalities with a sewered population of 5,350 and one industry producing organic waste with a population equivalent of 52,500 discharge waste directly to streams.

Four municipalities have primary treatment plants serving 3,300 people. Two (including one also having a primary treatment plant for a part of its sewage) provide no treatment to sewage from 2,050 people. The one industry discharging directly to the stream has undetermined treatment facilities.

All four of the municipal treatment plants are unsatisfactory with respect to capacity and operation.

No municipal or industrial waste treatment plants were completed in the period 1946-1949. Requirements for the industrial waste treatment plant are undetermined. Construction of five new municipal waste treatment plants to serve a population of 5,350 is required.

Final plans have been approved at one municipality for a new treatment plant and construction is awaiting financing at another. No formal action has been taken with a third community. The status of treatment works projects at two other communities and at one industry are undetermined.

Table A_{26}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	5	5,350	Not applicable
Total	5	5,350	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{26}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	52,500
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	1	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{26}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	4	4	3,300
Secondary	0	--	--
No treatment	**2	--	2,050

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in primary treatment.

Table D_{26}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.................	1	--	--	1

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{26}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	4	0	4	0	0	4	0
Industrial	--	--	--	--	--	--	--

Table F_{26}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{26}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**5	5,350	--
Enlargement or additions to existing plant	0	--	--
Replace existing plant	0	--	--
No project required	0	--	--
Undetermined	0	--	1

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one new plant at one municipality to replace an unsatisfactory plant and treat additional sewage now discharged directly to a watercourse. Due to local conditions three other municipalities with plants classified as unsatisfactory are considered to require new plants rather than replacements.

Table H_{26}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	1	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	1	--
Construction awaiting financing	1	--
Under construction	--	--
Status undetermined	2	1

Table I_{26}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Cedar Key....................	400	New plant	--
Dade City....................	1,800	New plant	Construction awaiting financing
Citrus processing plant....	52,500	Undetermined	--
Dunnellon....................	1,150	New plant	--
Inverness....................	1,900	New plant	Final plans approved
Williston....................	100	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

TAMPA BAY AREA SUB-BASIN

General Description

This drainage area is situated around Tampa Bay, a deep two-pronged bay midway down the Gulf Coast of Florida. It comprises 3,500 square miles entirely within the State of Florida and is made up of the several small watersheds lying between and to the west of the Withlacoochee and Peace River Sub-Basins and draining to the Gulf of Mexico either thru or near Tampa Bay. The principal streams of the area are, from north to south: Anclote River, Hillsborough River, Alafia River, Little Manatee River, Manatee River, and, a tributary of the Manatee River, the Braden River. These rivers are relatively short, rising not more than 30 miles inland, have flat slopes and wind considerably before reaching tidal estuaries of the Bay or Gulf.

The area is low and flat and contains numerous lakes, sinks, marshes and woodlands. The shore, frequently indented with tidal estuaries and bayous, is separated from the Gulf by numerous off-shore islands which form protected shallow bays.

The climate of the region is semi-tropical with rainfall limited in winter and bountiful in summer. Mean annual temperatures average in the low 70's and mean annual rainfall is about 50 inches. Killing frosts may occur as often as once a year but frequently not more than once every other year. The area is subject to tropical hurricanes during late summer and early fall.

Records for the four watersheds of the area, namely: the Hillsborough, Alafia, Little Manatee, and Manatee River basins, show run-off averages a little over one cubic foot per second per square mile. In the northern part of the area drainage is very poor and run-off is negligible.

Based on the 1940 census the area's population was 353,266. The 1950 preliminary census indicates a population of 489,713, an increase of 39 percent over 1940.

Economic Development

More than half of the population is found in the larger cities, namely: Tampa, St. Petersburg, Sarasota, Clearwater, and Bradenton, all of which are located on the coast. In the northern section of the area population is sparse, most of the non-urban population being found in the southern half of the sub-basin. In 1940 over two-thirds of the population was urban; in 1950 the urban population is estimated to be about 60 percent. Due to the increased number of unincorporated communities in the past decade, population of urban density probably exceeds that estimated for 1940. The urban communities as listed by the census numbered nine in 1940 and twelve in 1950. During the winter months there is an influx of tourists which almost doubles the population of some of the cities.

The area is bountifully provided with natural resources, and has a favorable climate. There are fertile soils which support some of the principal truck crops of the State as well as leading citrus fruits and strawberry crops in the nation. Watered areas inland and the sea coast combine with the climate to provide one of the nation's winter playgrounds.

Some of the country's highest grade phosphate rock is mined and processed in the southern section of the area and in the adjoining Peace River Sub-Basin. Agriculture is the leading pursuit in the areas around Plant City and between Tampa and Palmetto. The former is the country's leading strawberry center and the latter contains one of the State's chief winter, truck farming sections. Extensive citrus groves and some of the State's leading cattle production are in the area. Fishery resources provide for considerable employment along the coast and considerable sport throughout the entire area.

Florida's Gulf Coast "Gold Coast", from New Port Richey to Venice, including much of the shores of Tampa Bay, enjoys a prosperous tourist trade. The Gulf Shore from Duwedin to Pass-a-Grille and Bradenton to Sarasota, and on to Venice, is a continuous resort, winter and summer. Numerous other tourist attractions are found throughout the area, among which are the art and cultural center and circus winter quarters at Sarasota, Weekiwachee Springs south of Crystal River, and the sponge fleet and exchange at Tarpon Springs.

Industry is for the most part centered at Tampa, although a variety of small industries are found throughout the area.

Some of the more important industries are: processing of food, such as fruits, vegetables, and meat; mining and production of chemicals and allied products, cigar manufacturing, sponge fishing, and boat building.

Use of Water Resources

In the area there are 46 public water supplies serving 436,060 people. Of these, only three, serving 190,000 people, are derived from surface-water sources and one of the three derives half of its water from ground sources.

Specific information on industrial water supplies is not available but considerable water is used for industrial and agricultural purposes.

Water along with the climate makes this area a recreation spot of national importance. Parks and memorials have been developed for recreational use. Bathing, boating and fishing are quite widespread. Commercial fishing is an important pursuit and shellfish is of commercial importance, although pollution of the water has decreased its value. Fish and wildlife of the area attract hunters from places hundreds of miles distant.

Tampa harbor is one of Florida's major harbors, handling about 4,000,000 tons annually of export-import and coastwise shipments. Current plans of the U. S. Army Engineers call for improvements of harbors and navigation channels in the area.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in table A_{27} through I_{27}, inclusive.

Waters of the area receive the sewage effluent from 29 communities, 28 of which have a total sewered population of 337,345. Sixteen industrial sources of pollution, discharging wastes directly to the waters, are currently reported.

Reported existing treatment facilities of the area are 17 primary sewage treatment plants serving 192,165 people of 17 municipalities. Of these plants 13 are considered to be of unsatisfactory design capacity and 12 are unsatisfactorily operated. Adequacy of two municipal plants is undetermined. Treatment of industrial wastes in the sub-basin is undetermined. In 1949 two new sewage plants were built to serve a design population of 2,350. No other plants, municipal or industrial, were constructed during the period 1946 through 1949.

Municipal treatment plant requirements include 16 new plants, 15 of which would serve 162,780 people, two plant enlargements or additions to serve 10,635 people, and seven replacement plants to serve 158,680 people. No project is required for three existing municipal plants serving 4,250 people. There are 1,000 people served by one system for which project requirements have not been determined The waste treatment facilities required for the 16 industrial establishments are undetermined.

Progress in pollution abatement is indicated by the four municipal projects under construction and preparation of plans at another. No formal action has been taken to initiate 15 projects and for six others the progress of abatement has not been determined. The status of treatment works projects for the 16 industrial establishments is undetermined.

Table A_{27}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	**Population served by sewerage system**	**Amount of pollution discharged to watercourse (in terms of equivalent number of people)****
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	28	337,345	Not applicable
Total	***29	337,345	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one source for which no population served or pollution discharged figures are available.

Table B_{27}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	11	Undetermined
Producing inorganic wastes	**6	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***16	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes one plant also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_{27}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	17	17	192,165
Secondary	0	--	--
No treatment	**12	--	145,180

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one municipality for which population served data are not available.

Table D_{27}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.................	8	--	--	8
Chemical and allied products................	2	--	--	2
Leather and leather products................	1	--	--	1
Mining (phosphate)........	5	--	--	5
Total.................	16	--	--	16

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{27}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	17	2	13	2	3	12	2
Industrial	--	--	--	--	--	--	--

Table F_{27}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	2	2,350	0	--

Table G_{27}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**16	162,780	--
Enlargement or additions to existing plant	2	10,635	--
Replace existing plant	***7	158,680	--
No project required	[1]3	4,250	--
Undetermined	[2]1	1,000	16

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one plant for which no population served figure is available. Due to local conditions five municipalities with plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements.

***One plant undetermined as to capacity, has been considered to need a replacement.

[1] Due to local conditions one plant classified as undetermined in capacity has been in the no project category.

[2] Project requirements for one municipality without treatment have not been determined.

Table H_{27}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	15	--
Abatement ordered	--	--
Plans under preparation	1	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	4	--
Status undetermined	6	16

Table I_{27}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Bradenton	7,500	New plant	--
Brewster:			
Mining (phosphate)	Not known	Undetermined	--
Brooksville	1,000	Undetermined	--
Clearwater	10,135	Additions to existing plant	--
Crystal River	500	Enlargement of existing plant	--
Ellenton	400	New plant	--
Hillsborough County:			
Meat packing industry	Not known	Undetermined (3)	--
Largo	1,000	Replacement of existing plant	--
County Home	200	Replacement of existing plant	--
Mulberry	1,600	Replacement of existing plant	--
Mining (phosphate)	Not known	Undetermined	--
New Port Richey	600	New plant	--
Nichols:			
Mining (phosphate)	Not known	Undetermined	--
Palmetto	3,500	New plant	--
Pass-a-Grille Beach	900	New plant	Plans under preparation
Pierce	800	New plant	--
Mining (phosphate)	Not known	Undetermined	--
Port Tampa	500	Replacement of existing plant	--
Safety Harbor	350	Replacement of existing plant	--
St. Petersburg	150,000	Replacement of existing plant	--
Sarasota	10,000	New plant	Under construction
Sulphur Springs	530	New plant	--
Tampa	117,000	New plant	Under construction
McDill Air Base	6,000	New plant	--
Maryland Park	2,650	New plant	--
New Suburb Beautiful	1,000	New plant	--
Orient Park	Not known	New plant	--
Palma Ceia Park	4,600	New plant	--
Virginia Park	3,800	New plant	--
Chemical industries	Not known	Undetermined (2)	--
Food and kindred products industries	Not known	Undetermined (5)	--
Tarpon Springs	3,500	New plant	--
Leather and leather products	Not known	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

PEACE RIVER SUB-BASIN

General Description

The Peace River Sub-Basin lies entirely in Florida. It is bounded on the north by the Withlacoochee River Sub-Basin, on the east by the Kissimmee River and Lower Florida Area Sub-Basins, on the southwest by the Gulf of Mexico, and on the west by the Tampa Bay Area Sub-Basin.

The Peace River rises in the lake region of Central Florida and flows in a general southerly direction to enter the Gulf of Mexico through Charlotte Harbor. The topography of the sub-basin is flat to the extent that the boundaries in some areas are difficult to determine. The northern part of the sub-basin has numerous natural lakes.

The total drainage area is approximately 2,902 square miles.

Average annual rainfall is about 55 inches in the northern part of the sub-basin and nearly 51 inches toward the southern extremity. A 16-year record of the U.S. Geological Survey gauge at Arcadia, where the drainage area is 1,380 square miles, shows the average discharge to be 1,191 cubic feet per second. The maximum discharge at this point was 36,200 cubic feet per second, and the minimum was 41 cubic feet per second. A second major stream in the sub-basin, the Miakka River which flows into Charlotte Harbor to the west of the Peace River, has a smaller discharge.

The climate of the sub-basin is semi-tropical. The mean annual temperature varies from about 72°F. in the northern end of the area to nearly 74°F. in the south.

The total population of the sub-basin based upon the 1940 census was 55,879. The preliminary 1950 census reports a population of approximately 103,231, or an increase of about 85 percent over that of 1940.

Economic Development

The sub-basin contains seven urban communities which comprise 60 percent of the total population. In 1940 there were six urban communities which comprised 44 percent of the total. Five of these communities are located in Polk County. The population is principally distributed along the Peace River, and along the western divide between this sub-basin and the Tampa Bay Area Sub-Basin.

Agriculture is the chief occupation in the sub-basin, particularly the growing of citrus fruits, but many square miles are entirely devoted to grasslands that are used for beef cattle grazing.

The major industry, other than agriculture, is the mining of phosphate rock. This sub-basin, and to a lesser extent, other sections of Florida combined supply approximately 75 percent of the nation's output of phosphate rock. It has been estimated by the U.S. Geological Survey that Florida has 19 percent of the world's supply of phosphate.

Another important industry is the processing and canning of citrus fruits and juices. Other industries include tanning and wood products processing.

Probably the third most important source of revenue in the sub-basin is the tourist trade. This is concentrated for the most part in the lake region in the northern part of the sub-basin.

Use of Water Resources

There are 14 public water supplies in the sub-basin, two of them from surface sources serving 9,000 people.

The upper portion of the sub-basin is attractive to tourists because of the numerous lakes and the recreational opportunities they provide. Charlotte Harbor is one of the finest salt water fishing grounds in the State. Boating is a popular sport there.

The chief use of the waters of the Peace River is for hydro-separation and flotation in the phosphate mining industry. It is also used to carry away waste, particularly from the phosphate mining operations. Steps to correct this latter practice are now in progress.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{28} through I_{28}, inclusive.

Nine municipalities with a total sewered population of 39,000 discharge pollution to watercourses of the sub-basin. Twenty-one industries also discharge pollution directly to streams. Eleven of these produce organic waste having a population equivalent of 220,000. Five produce organic wastes in undetermined quantities, and six[9] produce inorganic waste.

Five municipalities have primary treatment plants serving 12,100 people. Three municipalities have secondary treatment plants serving 23,050 people. One municipality, having a sewered population of 3,850, provides no treatment. Of the 21 sources of industrial pollution, five have treatment facilities.

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[9] One included also under organic waste.

The design capacity and operation of three of the municipal treatment plants is satisfactory, four unsatisfactory, and of one undetermined. The five industrial waste treatment plants are satisfactory in capacity. One of the latter is reported as unsatisfactory as to operation.

There was one municipal sewage treatment plant to serve 20,000 people constructed during the period 1946 through 1949, but no industrial waste treatment plants were constructed during that period. Construction of four new municipal plants to serve 12,750 people and addition to one plant serving 2,700 persons is required. No project is required for three municipal plants serving 23,350 people and five industrial plants. Requirements for one municipal plant serving 200 people and 16 industrial plants are undetermined.

One new municipal waste treatment plant is under construction, plans are under preparation for one other, and no formal action has been taken by four municipalities.

Table A_{28}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	9	39,000	Not applicable
Total	9	39,000	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{28}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	11	220,000
Producing organic wastes	5	Undetermined
Producing inorganic wastes	**6	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***21	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**One included also under organic wastes.

***Total adjusted to correct for duplication noted in footnote marked,**.

Table C_{28}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	5	5	12,100
Secondary	3	3	23 050
No treatment	1	--	3,850

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{28}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	15	--	--	15
Leather and leather products................	1	--	--	1
Mining (phosphate)........	5	5	0	0
Total.................	21	5	--	16

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{28}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	8	3	4	1	3	4	1
Industrial	5	5	0	0	4	1	0

Table F_{28}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	1	20,000	0	--
1949	0	--	0	--

Table G_{28}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	4	12,750	--
Enlargement or additions to existing plant	1	2,700	--
Replace existing plant	0	--	--
No project required	3	23,350	5
Undetermined	1	200	16

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

Table H_{28}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	4	--
Abatement ordered	0	--
Plans under preparation	1	--
Final plans approved	0	--
Construction awaiting financing	0	--
Under construction	1	--
Status undetermined	0	16

Table I_{28}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Arcadia......................	3,850	New plant	--
Auburndale:			
Citrus processing plants....	Not known	Undetermined (2)	--
Bartow......................	5,400	New plant	Under construction
Citrus processing plants....	Not known	Undetermined	--
Meat packing plant..........	Not known	Undetermined	--
Vegetable cannery...........	Not known	Undetermined	--
Dundee:			
Citrus processing plant.....	Not known	Undetermined	--
Eagle Lake:			
Citrus processing plant.....	Not known	Undetermined	--
Fort Meade..................	2,000	New plant	--
Highland City:			
Citrus processing plant.....	Not known	Undetermined	--
Lake Alfred:			
Citrus processing plant.....	Not known	Undetermined	--
Lakeland:			
Leather and leather products	Not known	Undetermined	--
Punta Gorda.................	1,500	New plant	Plans under preparation
Wauchula....................	2,700	Additions to existing plant	--
Winterhaven:			
Citrus processing plants....	Not known	Undetermined (3)	--
Dairy products industry.....	Not known	Undetermined (2)	--
Zolfo Springs...............	200	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

KISSIMMEE RIVER SUB-BASIN

General Description

The Kissimmee River Sub-Basin is bounded on the north and east by the St. Johns River Sub-Basin, on the east by the Florida East Coastal Area Sub-Basin on the south by the Lower Florida Area Sub-Basin, and on the west by the Peace and Withlacoochee River Sub-Basins.

The Kissimmee River rises in central Florida and flows through a chain of lakes in a southerly direction to Lake Okeechobee. The sub-basin drains an area of about 3,729 square miles. At the western edge of the sub-basin a series of inter-connecting lakes, which formerly drained into the Kissimmee River, now drain into Lake Okeechobee through the Istokpoga Canal.

The western edge of the sub-basin is characterized by rolling hills interspersed with small clear lakes. The eastern part is a flat grassy plain.

The average annual rainfall varies with location from 45 to 50 inches, but occurs mostly during the summer months. Maximum rainfall per twenty-four hours may be extremely high, such as nine inches, which results in many instances in flooding the surrounding country. A 17-year record of the U.S. Geological Survey gauge near Okeechobee, Fla., where the drainage area is 3,260 square miles, shows the average discharge to be 1,806 cubic feet per second. The maximum discharge at this point was 15,600 cubic feet per second, and the minimum was 231 cubic feet per second.

The climate of the sub-basin may be considered to be sub-tropical. The mean annual temperature is about 72°F. The number of days per year without killing frosts varies from 310 to 365.

The total population of the sub-basin based upon the 1940 census was 46,883. Twenty-one percent of this population was urban. The preliminary 1950 census indicates a population of 72,654 with forty percent urban.

Economic Development

The sub-basin contains six urban communities, one of which has reached that status since 1940.

Agriculture is the chief occupation of the sub-basin with citrus fruit and beef cattle being the principal products. Kissimmee is probably the largest cattle market in the State.

The major industry is concerned with the processing of citrus products. The area also enjoys a profitable tourist trade during the winter months.

Use of Water Resources

There are 20 public water supplies in the sub-basin serving 39,335, six of which are from surface sources and serve 8,880 persons.

The numerous lakes and the large wilderness area in the sub-basin provides habitat for fish and wildlife, and affords excellent hunting and fishing. Portions of some of the lakes, however, are seriously polluted.

Surface water resources of the sub-basin are used for irrigation. A limited amount of commercial fishing is done on Lake Okeechobee and on the headwaters lakes.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{29} through I_{29}, inclusive.

Eight municipalities with a sewered population of 13,050 and five industries producing organic waste discharge pollution to watercourses of the sub-basin. Three of these industries discharge waste having a population equivalent of 51,000. The amount of waste discharged by the remaining two is undetermined.

Of the eight municipalities, three have primary treatment plants serving 6,800 people, four have secondary treatment plants serving 5,450 persons, and one having a sewered population of 800 provides no treatment. Facilities at the five industries are undetermined.

The design capacity of one municipal treatment plant is satisfactory, and that of six is unsatisfactory. Operation at two is satisfactory and unsatisfactory at five.

No municipal or industrial waste treatment plants have been constructed during the period 1946-1949. One new municipal plant to serve 800 people is needed, enlargement is required at four others to serve 6,200 persons, and two to serve 5,300 people require replacement. No project is needed at one serving a population of 750. Treatment requirements for the industrial plants are undetermined.

Plans are under preparation at two municipalities for construction of treatment plants. Final plans have been approved for one project. No formal action has been taken with one municipality to abate pollution. The status projects for three municipalities and the five industries is undetermined.

Table A_{29}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	8	13,050	Not applicable
Total	8	13,050	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{29}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	3	51,000
Producing organic wastes	2	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	5	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{29}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	3	3	6,800
Secondary	4	4	5,450
No treatment	1	--	800

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{29}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	5	--	--	5

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{29}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	7	1	6	0	2	5	0
Industrial	--	--	--	--	--	--	--

Table F_{29}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{29}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	1	800	--
Enlargement or additions to existing plant	4	6,200	--
Replace existing plant	2	5,300	--
No project required	1	750	--
Undetermined	0	--	5

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

Table H_{29}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	1	--
Abatement ordered	--	--
Plans under preparation	2	--
Final plans approved	1	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	3	5

Table I_{29}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served **	Project requirements	Remarks
FLORIDA			
Avon Park....................	1,500	Enlargement of existing plant	--
Davenport:			
Citrus processing industry..	Not known	Undetermined	--
Frostproof:			
Citrus processing industry..	Not known	Undetermined	--
Haines City..................	1,200	Enlargement of existing plant	--
Citrus processing industry..	Not known	Undetermined	--
Kissimmee....................	3,500	Replacement of existing plant	Plans under preparation
Lake Wales...................	1,500	Enlargement of existing plant	Final plans approved
Citrus processing industry..	Not known	Undetermined	--
Dairy........................	Not known	Undetermined	--
Okeechobee...................	800	New plant	--
St. Cloud....................	1,800	Replacement of existing plant	Plans under preparation
Sebring......................	2,000	Enlargement of existing plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

FLORIDA EAST COASTAL AREA SUB-BASIN

General Description

The Florida East Coastal Sub-Basin extends along the east coast of Florida from north of St. Augustine south to Stuart. The area is entirely within the State of Florida and contains approximately 2,848 square miles, a long narrow strip along the coast. It is bounded by the St. Johns and Kissimmee Sub-Basins on the north and west, the Lower Florida Area Sub-Basin to the south, and the Atlantic Ocean on the east.

The linking of tidal estuaries by the inland waterway canal has formed the chief waterway of this part of Florida. Although the direction of flow is affected by tidal action, flow of these streams is continuous.

Principal streams and their outlets are as follows: the North River, which empties into St. Augustine Inlet; Matanzas River, which diverts a portion of its flow to both St. Augustine and Matanzas Inlets; the Halifax River, emptying just south of Port Orange; and Indian River, from slightly north of Titusville to Stuart. There are a number of small tributaries extending from the inland canal to the ocean, and numerous small fresh water streams extend back from the estuaries both on the mainland and island sides of the waterway.

The topography of the area is flat, the maximum elevation being only a few feet above sea level, and slopes generally from the western boundary toward the ocean. Bays, tidal estuaries, and offshore islands make up the Atlantic shoreline.

An even, temperate climate is enjoyed in this region, the average temperature varying from about 74°F. in the southern extremity to 70°F. in the northern. Practically the entire year is frost free, resulting in a year long growing season. Yearly rainfall is between 48 and 50 inches, maximum precipitation occurring during the warm season months of June through September.

Summer rainfall is usually in the form of heavy thundershowers of one or two hours duration which occur on an average of every other day. From time to time this area is visited by hurricanes which are accompanied by excessive falls of rain. These tropical storms are very destructive. Periods of drought are rare and the humidity is usually high.

Economic Development

The 1940 census indicates the population of the sub-basin to be approximately 85,252, of which 34 percent was rural. The preliminary 1950 census shows a population increase to about 119,793, of which approximately 36 percent is rural. This data relates to permanent inhabitants only, however, the maximum population during the height of the winter tourist season having been estimated to exceed this total by 20 to 25 percent. There are ten incorporated municipalities with populations over 2,500, totaling 83,439 persons in the sub-basin. Of these, three, Daytona Beach, St. Augustine, and Ft. Pierce have populations in excess of 10,000.

The chief industries of the area are catering to the tourist trade and the production and processing of citrus fruits, ranking first and second in that order. In the northern section, truck farming is the principle form of agriculture. The central and southern sections grow mostly citrus fruits. A citrus canning and processing plant for citrus by-products is located at Fort Pierce. Daytona Beach and New Smyrna Beach have boat works for the production of pleasure craft, and St. Augustine is the center of a flourishing shrimp and fishing industry.

This part of Florida is a part of the noted "Florida Gold Coast" which attracts hordes of tourists and winter residents. An estimated $625,000,000 income from the tourist trade was realized during 1946 by the entire State, a fair share being made in this area.

Transportation throughout the area is provided by rail, highways, and waterways. The Florida East Coast Railway parallels the coast line, as does U. S. Highway No. 1. Transverse highways enter the area at practically every population center. The Intracoastal Waterway provides the main artery of waterborne traffic.

Use of Water Resources

There are a total of 17 municipal water supplies in this sub-basin, of which 16 are from ground water, and one from a lake. Approximately 94 percent of the total domestic consumption is served by the ground water supplies. No exact data are available regarding industrial consumption, but it is doubtlessly a relatively small percentage of the total.

Due to the highly colored nature of the inland waterways, recreational uses of these streams are chiefly restricted to boating and fishing. Some portions of the Indian River that are farthest from the inlets contain oxygen consuming organic matter to such a degree that fish cannot live in them. The inland waterway, and tidal estuaries and inlets are considered excellent sport fishing grounds, principally for salt water game fish.

In the past, sizable oyster beds in the vicinity of Port Orange, Sebastian, Vero Beach, and Ft. Pierce have supported a prosperous oystering business. However, the latter three and most of the growing beds at Port Orange have been condemned because of the discharge of sewage into these waters. Surveys indicate that pollution abatement measures could reclaim these areas for oyster production.

Since the maximum elevation of the area is approximately 30 feet above sea level, there is no opportunity for hydroelectric developments on any of the streams of the sub-basin.

Flood control in the area is accomplished by the use of canals and ditches which intercept surface runoff and carry it to the tidal waters. The waterways are also valuable to agriculture of the region by providing drainage during wet periods, and irrigation waters during dry seasons. Mosquito breeding has been materially reduced by drainage as has the breeding of the sand fly. Both of these insects prevented full utilization of the area in past years. Spray programs have been carried out in the sub-basin to eliminate malarial mosquitoes and pest insects.

The Intracoastal Waterway is the main passage for small craft which move seasonally between the northern and southern waters.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A $_{30}$ through I$_{30}$.

Data for population served by sewerage are available from twelve of the thirteen municipalities which are known to discharge wastes into natural waters of the area. No data have been submitted regarding the pollutional load being discharged. The effects of pollution have been mentioned previously regarding the condemnation of extensive oyster beds at Daytona Beach, Sebastian, Vero Beach, and Ft. Pierce. Preliminary reports resulting from surveys of the polluting streams in question indicate that the bacterial content of their waters and not gross pollution has been the cause of condemnation of the oyster growing areas. This fact would suggest that the pollution could be abated without undue difficulty, presumably by the treatment of the domestic sewage of contributing municipalities.

Of the 13 municipalities, ten having a total population of 33,410 have primary treatment only and three with a total population of 22,000 have no treatment facilities at all. Neither of the two industrial plants have treatment facilities. Of the municipal treatment plants, one was determined to be satisfactory regarding capacity, seven unsatisfactory, and two were undetermined. As to operation, three were satisfactory, five unsatisfactory, and two undetermined.

During the period 1946-1949 one municipal treatment plant having a design capacity of 66,500 was completed. No industrial plants were constructed during the same period.

It is considered that nine of the municipalities require new treatment plant facilities to effectively reduce pollution of the sub-basin waters, two require no additional facilities, and two are undetermined. Of the six municipalities requiring new plants, two have plans under preparation, two have the final plans approved, and one is under construction.

Table A$_{30}$. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	12	55,410	Not applicable
Total	***13	55,410	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one source for which no population served or pollution discharged figures are available.

Table B_{30}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	1	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	1	Undetermined
Total	2	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{30}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	10	10	33,410
Secondary	0	--	--
No treatment	3	--	22,000

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{30}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Chemical and allied products..................	1	--	--	1
Undetermined..............	1	--	--	1
Total....................	2	--	--	2

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{30}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	10	1	7	2	3	5	2
Industrial	--	--	--	--	--	--	--

Table F_{30}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	1	66,500	0	--

Table G_{30}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**9	32,260	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	***2	2,150	--
Undetermined	2	21,000	2

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one municipality for which no population served figure is available. Six municipalities with plants classified as unsatisfactory in capacity have been considered as requiring new plants rather than replacements.

***Due to local conditions, one plant classified as "unsatisfactory" in capacity, is considered as requiring no waste treatment project at the present time.

Table H_{30}. Status of treatment works project to abate pollution, July 1,1950

Status of project	Number	
	Municipal	Industrial
No formal action	1	--
Abatement ordered	--	--
Plans under preparation	2	--
Final plans approved	2	--
Construction awaiting financing	--	--
Under construction	2	--
Status undetermined	6	2

Table I_{30}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Cocoa	3,000	New plant	--
Daytona Beach	20,000	Undetermined	--
Eau Gallie	800	New plant	--
Fort Pierce	7,000	New plant	--
Industry of undetermined type	Not known	Undetermined	--
Malabar:			
Rendering plant	Not known	Undetermined	--
Marineland	1,000	Undetermined	--
Melbourne	2,000	New plant	Plans under preparation
New Smyrna Beach	4,000	New plant	Plans under preparation
Rockledge	Not known	New plant	Under construction
St. Augustine	12,100	New plant	Final plans approved
Stuart	1,000	New plant	Final plans approved
Titusville	2,360	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

LOWER FLORIDA AREA SUB-BASIN

General Description

The Lower Florida Area Sub-Basin, comprising approximately 11,000 square miles, lies south of a line from just north of Stuart on the east coast, through Lake Okeechobee, to north of Fort Myers on the west coast. To the north the area is bounded by the Peace and Kissimmee River Sub-Basins and the Florida East Coastal Area Sub-Basin. The east and west boundaries are the Atlantic Ocean and the Gulf of Mexico, respectively.

Natural drainage of the area is poor but has been improved greatly by many drainage canals. Lake Okeechobee, which receives water from the Kissimmee Sub-Basin and connected areas, lies about 30 miles from the Atlantic Coast and 60 miles from the Gulf of Mexico and has an average elevation of about 13 feet above mean sea level. This shallow, 730-square mile lake originally had no normal outlet but overflowed its southern rim and spread over the vast Everglades or slowly overflowed the flat area to the west and entered the Caloosahatchee River. Now drainage is accomplished by leveeing the southern shore and discharging the lake through artificial outlets (St. Lucie Canal to the east and a connection to Caloosahatchee River to the west), thereby affording a navigable waterway from coast to coast. The Everglades, covering over one-third of the area, originally was a vast sawgrass and water area, but now is partially drained by canals. It lies in a trough of sedimentary limerock and is bordered on the east by a narrow coastal ridge which attains elevations up to 13 feet above sea level and on the west by sandy ground rising to an elevation of 25 feet above sea level and embracing the areas known as the Devil's Garden and Big Cypress Swamp. The east coast is formed by a sandy strip from 5 to 10 miles wide which broadens at its southern end where the Everglades bend westward. There is a chain of islands or keys off shore which extends into the Atlantic Ocean and Florida Straits to Key West almost 100 miles off shore. From the area's northern border to Biscayne Bay these islands are separated from the mainland by lagoons into which short streams and drainage canals discharge. The southern and western coasts are bordered by mangrove swamps and thousands of islands.

In this part of Florida the four normal seasons of the temperate zone give way to the wet and dry seasons characteristic of the tropics. Mean annual temperatures average about 73^{0}F. and range from average January temperatures of 64^{0}F. to 70^{0}F. to average July temperatures of from 80^{0}F. to 84^{0}F. The humidity is generally very high throughout the area. Normal winds are generally from the southeast. The area lies in the path of tropical hurricanes which bring whirling, counter-clockwise winds reaching velocities in excess of 150 miles per hour. Hurricane season usually includes the months of August, September and October. Average annual rainfall varies from approximately 64 inches in the Everglades to a little over 50 inches at the northern border of the area. About 70 percent of the rainfall occurs from May through October, the wet season. The July and August temperatures are moderated considerably by the almost daily showers.

Run-off is very low because of the flat topography and absorptive characteristics of the soils. When continued rains saturate the soil and fill up the natural lakes and sloughs, water overflows the inadequate drainage channels, and spreads over the low lands. Natural drainage is slow and artificial outlets, pumping and dikes are used to accelerate the run-off.

The 1940 population of the area was 435,307 and according to 1950 preliminary figures the population has increased to 754,736.

Economic Development

Both the 1940 census and 1950 preliminary figures indicate that urban population amounts to approximately three-fourths of the total. The number of urban centers increased from 17 in 1940, to 28 in 1950. The east coast in this area is an almost continuous line of small cities many of which in themselves do not qualify as urban, but being so closely located create developed areas of urban population density. It is along this coast that by far the major portion of the population of the area is found. There are a few communities built up along the shores of Lake Okeechobee and one city on the west coast in the northwest corner of the area.

The population figures given for the area do not include winter residents which almost double the number of permanent residents. Migratory workers greatly increase the population of the Lake Okeechobee area during the period of heaviest crop harvest which is also in the winter. Except for Ft. Myers, the west coast and most of the interior of the area are very sparsely populated. A few fishing villages are found along the coast. Inland there are some Indian villages and hunting lodges. Agricultural pursuits, food processing, commercial fishing and catering to the tourist trade provide the principal employment of the area.

Resources of the area are numerous. The muck soil is rich and very productive. Fisheries are of great value. Oil is produced in commercial quantities at one well in the Big Cypress Swamp, and drilling is in active progress in other parts of the area. Vast pasture lands are open range. Perhaps the most outstanding resource of the area is the water and climate which attracts visitors year around from all parts of the country. Wildlife is varied throughout the sub-basin, but because of the extensiveness of the area hunting is not concentrated to any great extent in any particular portion.

Use of Water Resources

Water for domestic purposes is furnished 539, 745 persons of the area by 65 public supplies. There are nine surface sources serving 43, 197 people and 57 ground sources serving 496, 548 people. One public supply uses both ground and surface source. There is sufficient water throughout the area for stock. Surface water level in some areas is controlled for both irrigation and drainage.

The major use of water other than for domestic purposes is for recreation. Water throughout the area supports one or more of the following activities: bathing, boating, wildlife, and sport fishing. Commercial fishing is an important pursuit. Lake Okeechobee is declared salt water for the purposes of allowing commercial fishing. It is unlawful to sell fish caught in fresh water in the State. The major harbors are Port Everglades at Ft. Lauderdale and Miami.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{31} through I_{31}.

There are 22 communities, serving 258, 940 people, discharging sewage to the waters of the area. Sewage is treated in 11 primary plants serving 74, 450 people in ten communities and in three secondary plants serving 30, 370 people in three other communities. Sewage from nine communities, 154, 120 people, receives no treatment. Of the 14 sewage treatment plants ten have unsatisfactory design capacity and nine are unsatisfactorily operated. There are three industrial establishments (two food processing and one gas plant) discharging liquid wastes the treatment of which is unreported. Since 1945 there have been two sewage treatment plants constructed, one in 1948 for a design population of 3, 000 and one in 1949 for a design population of 25, 000.

Requirements for municipal sewage treatment facilities are reported as: 14 new plants to serve 207, 570 people, enlargements or additions to two plants serving 3, 000 people and replacement of one plant serving 2, 000 people. No projects are required for six facilities serving 46, 370.

Industrial waste treatment requirements have not been determined. Progress in pollution abatement is indicated by preparation of plans for six facilities and construction of three projects awaiting financing. For one project needed there has been no formal action for abatement, and for seven the status of abatement is undetermined. The status of the three industrial establishments in this respect is undetermined.

From an economic standpoint, the protection of tidal waters along the entire east coast and the Gulf coast in the vicinity of Ft. Myers is by far the most pressing pollution control problem. These areas are the leading tourist centers of the State and continuance of the tourist trade depends to a great extent on recreational use of waters. Commercial shell fishing and other water uses are being adversely affected by increasing pollution near urban areas.

The Corps of Engineers is carrying on extensive flood control and harbor projects throughout the area. Maintenance of surface water levels in the drainage canals is expected to prevent further encroachment of the salt water into the ground water reservoirs.

Table A_{31}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	22	258,940	Not applicable
Total	22	258,940	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{31}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	—
Producing organic wastes	2	Undetermined
Producing inorganic wastes	**1	Not applicable
Producing wastes of undetermined type	1	Undertermined
Total	***3	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

Table C_{31}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	10	11	74,450
Secondary	3	3	30,370
No treatment	9	—	154,120

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{31}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	2	--	--	2
Products of petroleum and coal....................	1	--	--	1
Total.................	3	--	--	3

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{31}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	14	4	10	0	5	9	0
Industrial	--	--	--	--	--	--	--

Table F_{31}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	1	3,000	0	--
1949	1	25,000	0	--

Table G_{31}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**14	207,570	--
Enlargement or additions to existing plant	2	3,000	--
Replace existing plant	1	2,000	--
No project required	***6	46,370	--
Undetermined	0	--	3

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Five municipalities with plants classified as unsatisfactory in capacity have been considered to require new plants rather than replacements.

***One municipality with two plants classified as unsatisfactory in operation is considered to require no projects since the disposal of its wastes is considered satisfactory at the present time.

Table H_{31}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	1	--
Abatement ordered	--	--
Plans under preparation	6	--
Final plans approved	--	--
Construction awaiting financing	3	--
Under construction	--	--
Status undetermined	7	3

Table I$_{31}$. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
FLORIDA			
Boynton Beach	800	New plant	--
Dania	3,000	New plant	Plans under preparation
Vegetable cannery	Not known	Undetermined	--
Delray Beach	2,000	Additions to existing plant	--
Everglades	300	New plant	--
Fort Myers	11,000	New plant	Plans under preparation
Hallandale	1,520	New plant	--
Hollywood	1,800	New plant	Plans under preparation
Homestead	1,000	Additions to existing plant	Plans under preparation
LaBelle	400	New plant	--
Lakeworth	11,000	New plant	Construction awaiting financing
Lantana	250	New plant	--
Miami	100,000	New plant	Plans under preparation
Petroleum and coal products industries	Not known	Undetermined	--
Miami Beach	32,000	New plant	Plans under preparation
Moore Haven:			
Dairy products industry	Not known	Undetermined	--
Palm Beach	3,000	New plant	Construction awaiting financing
Pompano	2,000	Replacing existing plant	--
Riviera Beach	1,500	New plant	--
West Palm Beach	41,000	New plant	Construction awaiting financing

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

FLINT RIVER SUB-BASIN

General Description

The Flint River Sub-Basin is bounded on the east by the Ocmulgee, Suwannee and Ochlockonee-St. Marks River Sub-Basins, on the south by the Apalachicola River Sub-Basin, and on the west and north by the Chattahoochee River Sub-Basin. The Flint River Sub-Basin comprises 8,315 square miles which lie entirely within the State of Georgia.

The Flint River has its source in the Piedmont Plateau near Atlanta and flows southward 350 miles in an easterly arc to its confluence with the Chattahoochee River at the Florida State line. Its drainage basin extends 215 miles from north to south with an average width of about 40 miles. The river is generally spring-fed in the Coastal Plain and is characterized by relatively clear water.

The population of the Sub-basin was 403,918 based on the 1940 census. The preliminary 1950 census indicates the population to be 413,718.

Economic Development

There are 17 urban communities entirely within the sub-basin and three others partially within it. These urban communities together constitute 32 percent of the total Sub-basin population. In 1940 the urban population was 24 percent of the total.

The principal natural resources of the Sub-basin are its fertile soils and timber supply. Agricultural activities are predominant. The two leading crops are short-staple cotton and peanuts. Other farm products include corn, peaches, pecans, and melons.

Industries of the region fall into three principal categories: the manufacture of food and kindred products, chemical and allied products, and textile mill products.

Use of Water Resources

The sub-basin contains 57 public water supplies which serve 125,010 people. Six of these supplies are from surface sources and serve a population of 33,430.

There are two power dams on the Flint River above Albany and smaller power plants on several of the tributaries. The waters impounded by these dams are used for recreational purposes.

A new multiple-purpose dam nearing completion on the Apalachicola River just below the junction of the Flint and Chattahoochee Rivers will create a reservoir partly on the Flint which will offer opportunity for development along recreational lines. This reservoir also will provide for a nine-foot navigable channel to Bainbridge. At the present time navigation has practically disappeared on the Flint.

Pollution and Pollution Control

The Georgia Water Pollution Control Agency has not made available to the Southeast Drainage Basins Office complete information on pollution and pollution control in this sub-basin. The incomplete data presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Table A_{32}. Sources of pollution, municipal

Municipal-ities*	Sources of pollution (in number of munici-palities)	Population served by sewerage system	Amount of pollution discharged to water-course (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	0	--	--
Having population data available (Data on pollution load to watercourse incomplete or not available)	29	83,825	Not applicable
Total	29	83,825	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{32}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	89	Undetermined
Total	89	--

*Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{32}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	12	12	12,850
Secondary	5	5	25,800
No treatment	12	--	45,175

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

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Table D_{32}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having: Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	34	--	--	34
Textile mill products......	5	--	--	5
Lumber and wood products...	1	--	--	1
Paper and allied products..	1	--	--	1
Chemical and allied products................	42	--	--	42
Fabricated metal products..	1	--	--	1
Miscellaneous..............	5	--	--	5
Total..................	89	--	--	89

*The industrial plants, listed by type, are from the "Manufacturers of Georgia" (prepared by the Georgia Agricultural and Industrial Development Board) selected as those industries within the sub-basin probably contributing to the pollution of the streams. They may or may not have separate waste outlets discharging directly to watercourse.

Table E_{32}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	17	--	--	17	--	--	17
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{32}. Progress in pollution abatment

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	1	1,025	0	--
1947	0	--	0	--
1948	1	10,000	0	--
1949	1	2,000	0	--

Table G_{32}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	--	--	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	--	--	--
Undetermined	29	83,825	89

*The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

Table H_{32}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	--	--
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	29	89

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{32}. Project list* - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950

Name	Population served	Project requirements	Remarks

*The Georgia Water Pollution Control Agency has not made available the information necessary for compilation of this table.

CHATTAHOOCHEE RIVER SUB-BASIN

General Description

The Chattahoochee River Sub-Basin is bounded on the north by the Tennessee River Basin; on the east by the Savannah, Oconee, Ocmulgee, and Flint River Sub-Basins; on the south by the Apalachicola River Sub-Basin; and on the west by the Choctawhatchee, Tallapoosa, and Coosa River Sub-Basins.

The Chattahoochee River drains approximately 8,647 square miles, including 5,992 square miles of Georgia, 2,537 square miles of southeastern Alabama, and 118 square miles of Florida. The river rises in the Blue Ridge Mountains of northeastern Georgia and flows 436 miles to its confluence with the Flint River at the southwest corner of Georgia. The river is the west boundary of Georgia south of West Point, Ga. Its watershed lies in three distinct physiographic provinces, the Appalachian Highland, the Piedmont Plateau, and the Coastal Plain. In the first two named, numerous hills and mountains rise to 2,500 to 3,000 feet above sea level.

The upper reaches of the Chattahoochee River are characterized by the steep slopes of mountain streams, but below Gainesville, Ga., the slope is fairly uniform, averaging 2.6 feet per mile to the Alabama State line. The river falls 397 feet between this point and Columbus, Ga., an average slope of 10 feet per mile. A slope of 0.9 foot per mile is obtained in the 145 feet of fall from Columbus to the mouth. The banks are steep and high, attaining the eminence of bluffs in some places. The course of the river is characterized by unusually long and straight reaches through the middle of the valley.

The Chattahoochee River Sub-Basin is characterized by its lack of important tributaries, which is reflected in its narrow width (averaging 28 miles with a maximum of 55 miles), and its length (approximately 320 miles).

Average annual rainfall varies from about 61 inches in the north to 49 inches in the mid portion to almost 54 inches near its confluence with the Flint River. A nineteen-year record of the U.S. Geological Survey gauge at Columbia, Ala., where the drainage area is 8,040 square miles, shows the average discharge to be 5,791 cubic feet per second. The maximum recorded discharge at this point was 203,000 cubic feet per second, and the minimum discharge recorded was 1,220 cubic feet per second.

The mean annual temperature for the area varies from 59°F. to 67°F. depending on latitude. The frost free growing season averages 214 days in the north and 250 days in the south.

The total population of the sub-basin based upon the 1940 census was approximately 742,050. The preliminary 1950 census reports indicate a population of 877,113.

Economic Development

The sub-basin contains 18 urban communities three of which are in Alabama and the remainder in Georgia. These communities constitute 49 percent of the total population in 1950 as compared with 48 percent in 1940. The decade since 1940 has seen an increase in both rural and urban population.

The economy of the sub-basin is one of combined agriculture and industry. The major agricultural products are peanuts, cotton, corn, peaches, truck crops, hogs and cattle, with the first two being the leading money crops. Poultry raising (broiler production) is a growing industry in the foothills of the mountains at the headwaters of the Chattahoochee River. An important part of Georgia's peach production comes from that portion of the valley between Atlanta and the Alabama State line.

Textiles comprise the major industry of the sub-basin both in Alabama and in Georgia. Important textile centers are Lanett, Shawmut, Langdale, Fairfax, River View, Phenix City, and Eufaula in Alabama; and Columbus, Marietta, Newnan, Douglasville, Atlanta, Gainesville, La Grange, and Hogansville in Georgia. Other major types of industry of importance in the sub-basin are furniture manufacturing, lumber and wood products, chemicals, implements and machinery, metal working, transportation, and food processing.

The city of Atlanta, Ga., is the metropolis of the sub-basin and in addition is the chief trading and railroad center of the State of Georgia. It is also the seat of State government. However, one third of Atlanta lies outside of the Chattahoochee River Sub-Basin.

Use of Water Resources

Ground water is inadequate as a source of public water supply in the upper reaches of the sub-basin. Out of a total of 53 public water supplies, 27 are from surface sources which serve a total of 618,415 people, or 94 percent of the total population served by public water supplies. In the coastal plain section of the sub-basin, however, ground water is abundant and is used as a source of public water supply.

The topography of the Chattahoochee River Sub-Basin is such that extensive hydroelectric development is possible. Seven dams for hydroelectric purposes, all inter-state in location, have been built along less than 40 miles of river between Columbus and West Point, Ga. Another low hydroelectric dam exists at Morgan Falls above Atlanta, Ga.

Plans have been approved and construction authorized for the further development of the river for navigation, hydroelectric and flood control. Jim Woodruff Dam, now under construction on the Apalachicola River just below the junction of the Chattahoochee and Flint Rivers, will impound a reservoir covering 37,500 acres. Dams authorized for construction near Columbia, Ala., and at Fort Benning, Ga., will impound waters to cover 34,500 acres and 1,250 acres respectively, and with Jim Woodruff Dam, will make possible a nine-foot navigable channel to Columbus, Ga., approximately 160 miles above the mouth of the river. A dam also is under construction near Buford, Ga., which will impound a reservoir covering 34,300 acres. It is anticipated that extensive recreational development will accompany the impoundment of these reservoirs.

Recreational developments at present, however, are limited. Bartletts Ferry Reservoir above Columbus, Ga., has been rather extensively developed, with swimming, fishing and boating as the major recreational attractions. A number of headwater streams in the northern mountains provide trout fishing. The river where not impounded, however, has a high velocity which makes swimming and boating dangerous.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{33} through I_{33}, inclusive. The Georgia Water Pollution Control Agency has not furnished the Southeast Drainage Basins Office complete information on pollution and pollution control in that part of this sub-basin which lies in the State of Georgia. The incomplete data for the Georgia municipalities and industries presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

Forty-four municipalities with a total sewered population of 401,815 discharge pollution to watercourses of the sub-basin. Fourteen of these communities, having a sewered population of 32,585 discharge sewage and industrial wastes having a population equivalent of 82,760. No population equivalent data were available to this office for 30 Georgia communities having a combined population of 369,230.

A total of 84 industries of the type normally considered to discharge wastes with polluting characteristics are located within the sub-basin. Eighty-two of these are located in Georgia and produce wastes of an undetermined type, but may or may not have separate outlets and may or may not have treatment facilities. The two remaining industries, located in Alabama, produce organic waste having a population equivalent of 14,250 and do not treat their waste.

Table A_{33}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	14	32,585	82,760
Having population data available (Data on pollution load to watercourse incomplete or not available)	***30	369,230	Not applicable
Total	44	401,815	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Georgia municipalities.

Sixteen of 44 communities have 19 primary treatment plants serving a population of 231,100. Nine communities (one also included with those having primary treatment) have 12 secondary treatment plants serving 47,180 persons. Twenty communities not providing treatment serve 123,535 people.

The Alabama portion of the sub-basin has two municipal treatment plants. The operation of these facilities is satisfactory but the adequacy of one in relation to design capacity is unsatisfactory. The design capacity and operation of treatment plants in Georgia is reported undetermined as the Georgia Water Pollution Control Agency has not submitted this information.

Table B_{33}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	2	14,250
Producing organic wastes	--	Undetermined
Producing inorganic wastes	--	Not applicable
Producing wastes of undetermined type	**82	Undetermined
Total	84	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

There have been six municipal treatment plants constructed in the period 1946 through 1949 to serve a total of 9,900 people. Seven new municipal plants to serve 8,500 people are required to abate pollution from the Alabama part of the sub-basin and no project is necessary at one municipality serving 1,000 persons. The needs of 43 municipalities serving 392,315 people in Georgia are unreported to this office. The needs at 82 industrial plants in the sub-basin are undetermined.

No formal action to abate pollution has been taken with seven municipalities and two industrial plants. The status of 43 municipalities and 82 industries is undetermined.

Table C_{33}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	16	19	231,100
Secondary	**9	12	47,180
No treatment	20	--	123,535

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in primary treatment.

Table D$_{33}$. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	38	--	1	37
Textile mill products......	22	--	1	21
Lumber and wood products...	1	--	--	1
Chemical and allied products..................	18	--	--	18
Products of petroleum and coal..................	1	--	--	1
Leather and leather products................	1	--	--	1
Miscellaneous..............	3	--	--	3
Total..................	84	--	2*	82**

*Information for the two plants in Alabama, which have separate outlets and discharge wastes directly to watercourse, furnished by the Alabama Water Improvement Advisory Commission.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets.

Table E$_{33}$. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	31	1	1	29	2	--	29
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F$_{33}$. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	1	600	0	--
1947	2	6,000	0	--
1948	2	1,700	0	--
1949	1	1,600	0	--

Table G_{33}. Requirements for municipal and industrial waste treatment plants*+

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	7	8,500	--
Enlargement or additions to existing plant	--	--	--
Replace existing plant	--	--	--
No project required	1	1,000	--
Undetermined	43**	392,315	84

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has furnished no information as to project requirements.

**Includes one municipality with a plant classified as unsatisfactory.

Table H_{33}. Status of treatment works project to abate pollution*, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	7	2
Abatement ordered	--	--
Plans under preparation	--	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined	43	82

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I_{33}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Abbeville..........................	2,000	New plant	Some industrial waste
Columbia..........................	500	New plant	--
Dothan:			
Meat packing plant..........	450	Undetermined	--
Eufaula..........................	3,800	New plant	Some industrial waste
Fairfax..........................	2,500	Undetermined	--
Textile mills..................	13,800	Undetermined	--
Headland..........................	450	New plant	--
Hurtsboro..........................	750	New plant	--
Lafayette..........................	800	New plant	--
Lanett..........................	6,450	Undetermined	Has textile waste with population equivalent of 50,000
Langdale..........................	100	Undetermined	--
Phenix City..........................	9,800	Undetermined	--
Riverview..........................	785	Undetermined	--
Roanoke..........................	200	New plant	--
Shawmut..........................	3,450	Undetermined	Includes part of Langdale

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for the completion of this table.

**Population equivalent for industry.

APALACHICOLA RIVER SUB-BASIN

General Description

The Apalachicola River Sub-Basin is bounded on the northeast by the Chattahoochee and Flint River Sub-Basins, on the east by the Ochlockonee-St. Marks River Sub-Basins, on the south by the Gulf of Mexico, and on the west by the Choctawhatchee River Sub-Basin.

The Apalachicola, the largest fresh-water river in the State of Florida, is formed by the confluence of the Chattahoochee and Flint Rivers at the southwest corner of the State of Georgia from whence it flows in a southerly direction to the Gulf of Mexico. It is a wide, shallow, meandering stream which carries a heavy silt load from the clay hills of Georgia and Alabama, and flows through a broad valley of extensive swamps. The Chipola River, the only major tributary in the sub-basin, rises in southeastern Alabama.

The total area within the sub-basin is 2,453 square miles, of which 321 square miles are in Alabama.

Average annual rainfall in the sub-basin varies from 55 inches to nearly 59 inches. A 19-year record of the U.S. Geological Survey gauge at Chattahoochee, Fla., which is near the source of the Apalachicola River and has a drainage area of 17,100 square miles, shows the average discharge to be 21,950 cubic feet per second. The maximum discharge at this point was 293,000 cubic feet per second, and the minimum was 5,120 cubic feet per second.

The climate is temperate and is characterized by bountiful, but not excessive, rainfall. The annual mean temperature is about 68°F. The number of days per year without frost is 250 to 280, but continuous periods of several years occur in which there is no frost.

The total population of the sub-basin based upon the 1940 census was 71,016. The preliminary census of 1950 indicates a population of 71,829.

Economic Development

The sub-basin contains four urban communities, all in Florida, having a combined 1950 population of 20,240, or 28 percent of the total sub-basin population.

The chief source of livelihood in the sub-basin is agriculture. Peanuts, cotton, corn, tobacco, hogs, and cattle are the principal products. In the southern part of the area a large proportion of the total income is from timber and fishing. A large paper mill is located at Port St. Joe.

Use of Water Resources

There are 13 public water supplies in the sub-basin, of which only one is a surface water supply serving 7,000 people.

Water resources are being utilized for power at Marianna, Fla. where a stream has been dammed for this purpose. At Apalachicola, Fla. the principal industry is commercial fishing and oystering.

A dam is under construction at Chattahoochee, Fla., which will be for combined power and navigation. The streams are utilized for a limited amount of commerce, principally the transportation of logs.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements, are shown in tables A_{34} through I_{34}, inclusive.

Ten municipalities with a total sewered population of 22,100 discharge wastes to watercourses of the sub-basin. Five of these municipalities have primary treatment plants which serve a population of 12,900. Five have secondary treatment serving 9,200 people.

Two industries producing organic waste having a population equivalent of 88,120 discharge untreated waste directly to streams.

The design capacity of six of the ten municipal treatment plants is adequate and four are unsatisfactory. Four are satisfactory with relation to operation and six are unsatisfactory.

Three new municipal treatment plants having a total design population of 7,750 were completed in 1949. Construction of three new plants to serve a population of 5,900 and one plant for a municipality having no sewerage system is necessary to abate pollution in the sub-basin. No project is required at seven municipalities having a sewered population of 16,200. Requirements at two industrial plants are undetermined.

No formal action for the abatement of pollution has been taken with three municipalities requiring projects. The status of one municipality is undetermined.

Table A_{34}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	1	300	30
Having population data available (Data on pollution load to watercourse incomplete or not available)	9	21,800	Not applicable
Total	10***	22,100	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Does not include one municipality having a population of 1,140, needing a complete sewerage system.

Table B_{34}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	2	88,120
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	2	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{34}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	5	5	12,900
Secondary	5	5	9,200
No treatment	0	--	--

*Includes incorporated or unincorporated municipalities, other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to the watercourse.

Note: One municipality with a population of 1,140, having no sewerage system, not included in this table.

Table D_{34}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	1	0	1	0
Paper and allied products..	1	0	1	0
Total..................	2	0	2	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{34}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	10	6	4	0	4	6	0
Industrial	--	--	--	--	--	--	--

Table F_{34}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	3	7,750	0	--

Table G$_{34}$. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**4	7,040	--
Enlargement or additions to existing plant	0	--	--
Replace existing plant	0	--	--
No project required	***7	16,200	--
Undetermined	0	--	2

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one municipality with no sewers for which sewers and treatment are recommended. Due to local conditions three municipalities with plants classified as unsatisfactory in capacity, have been considered as requiring new plants rather than replacements.

***One municipality with a plant classified as unsatisfactory in capacity has been considered to require no project since the disposal of its waste is satisfactory at the present time.

Table H$_{34}$. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	3	2
Abatement ordered	--	0
Plans under preparation	--	0
Final plans approved	--	0
Construction awaiting financing	--	0
Under construction	--	0
Status undetermined	1	0

Table I$_{34}$. Project list - municipalities and industries required improvements for abatement of pollution*, July 1, 1950

Name	Population served **	Project requirements	Remarks
ALABAMA			
Dothan:			
Food and kindred products...	120	Undetermined	--
FLORIDA			
Blonstown..........................	1,500	New plant	--
Chattahoochee......................	4,000	New plant	--
Cottendale.........................	400	New plant	--
Port St. Joe:			
Paper products.....................	88,000	Undetermined	--
Wewahitchka........................	1,140	New plant and sewers	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

CHOCTAWHATCHEE RIVER SUB-BASIN

General Description

The Choctawhatchee River Sub-Basin is bounded on the north by the Tallapoosa River Sub-Basin, on the east by the Chattahoochee and Apalachicola River Sub-Basins, on the south by the Gulf of Mexico, and on the west by the Perdido-Escambia River Sub-Basin. The river is formed in the Coastal Plain of southeastern Alabama and flows southwesterly some 90 miles prior to entering Florida, and thence about another 95 miles to enter Choctawhatchee Bay and the Gulf of Mexico. The major tributaries are the Pea River and Holmes Creek. In addition, a number of small coastal streams flow into Choctawhatchee Bay.

The total drainage area is about 6,415 square miles which is almost equally divided between the States of Alabama and Florida. The northern part of the sub-basin is characterized by rolling clay hills, while the southern part is more level and is dotted by swampy areas.

Average annual rainfall varies from about 52 inches in the northern part of the sub-basin to almost 66 inches in the southern part. A seventeen-year record of the U.S. Geological Survey gauge near Bruce, Fla., where the drainage area is 4,580 square miles, shows the average discharge to be 7,297 cubic feet per second. The maximum discharge at this point was 69,600 cubic feet per second, and the minimum discharge recorded was 1,680 cubic feet per second.

The mean annual temperature of this area varies from 65°F. to 68°F. The average number of frost free days varies from 250 to 300 days.

The total population of the sub-basin based upon the 1940 census was approximately 226,284. The preliminary census of 1950 indicates the population to be 241,755, an increase of six percent from the 1940 population.

Economic Development

The sub-basin contains 11 urban communities, eight of which are in Alabama. These 11 urban communities constitute, on the basis of the 1950 preliminary census, approximately 36 percent of the total population.

The sub-basin is primarily an agricultural area. Major agricultural products are peanuts, cotton, corn, truck crops, hogs, and cattle. The southern part of the area is mainly uncleared timber land with some stock raising.

Commercial fishing areas exist along the coast. Oysters are obtained commercially from tributary arms of St. Andrews Bay.

Industries consist of textile and fertilizer manufacturing, meat packing, and the refining of peanut and cotton seed oils. A large paper mill is located at Panama City, Fla. This city also has a sizable sea port. The tourist industry is developing rapidly along the Gulf coast.

Use of Water Resources

The Choctawhatchee River Sub-Basin is richly supplied with both ground and surface waters. There are 34 public water supplies in the sub-basin all taken from ground sources.

The principal use of the water resources is for recreation and commercial fishing. The streams are very popular for sport fishing, and those near population centers are used also for swimming. Important seaside recreational developments exist in the vicinity of Panama City, Fla. In the Alabama portion of the sub-basin, Lake Tholocco is the major recreational area.

A single low dam on the Pea River below Elba, Ala., is the only hydro-electric development in the sub-basin.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{35} through I_{35}, inclusive.

Twenty-six municipalities with a total sewered population of 68,450 and two municipalities for which no population served data are available discharge pollution to watercourses of the sub-basin. Seven industries discharge waste directly to streams. One of these industries produces organic waste having a population equivalent of 280,000, a figure greater than the entire population of the sub-basin, both sewered and unsewered. Five industries produce organic waste in undetermined amounts, and one produces inorganic waste.

Thirteen of the twenty-eight sewered municipalities have 14 primary treatment plants serving a population of 35,490, four have secondary treatment plants serving 2,350 people, and twelve[10] with a population of 30,615 have no treatment facilities. Of the seven industrial sources of pollution, four have waste treatment facilities, two have no treatment and one has undetermined facilities.

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[10] One municipality reported as also having secondary treatment for part of its sewage.

The design capacity of seven municipal treatment plants is satisfactory, and that of the remaining eleven is unsatisfactory. Operation at eleven of these plants is satisfactory and is unsatisfactory at seven. The adequacy of capacity of four industrial plants and the adequacy of operation of three of these are undetermined. The operation of the remaining one is unsatisfactory.

There have been no municipal or industrial waste treatment plants constructed during the period 1946 through 1949. Construction of 14 new municipal sewage treatment plants to serve population of 30,600, additions at five plants serving a population of 21,600, and replacement of two existing plants serving 1950 people are necessary to abate pollution in the sub-basin. No project is required at five municipalities having a sewered population of 10,415 or at two other municipalities for which no population served figures are available. The requirements for four industrial plants are undetermined.

Plans are under preparation at three municipalities for construction of treatment plants. The final plans have been approved for two other plants, but construction is awaiting financing. No formal action has been taken in regard to 17 municipalities and 2 industrial plants. The status of projects for two municipal and two industrial plants remains undetermined.

Table A_{35}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	17	43,015	41,315
Having population data available (Data on pollution load to watercourse incomplete or not available)	9	25,440	Not applicable
Total	***28	68,455	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to the watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes two municipalities for which no population served figures are available.

Table B_{35}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	280,000
Producing organic wastes	5	Undetermined
Producing inorganic wastes	1	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	7	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{35}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	14	35,490
Secondary	**4	4	2,350
No treatment	***12	—	30,615

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two municipalities for which no population served figures are available.

***One municipality also included in primary treatment.

Table D_{35}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products................	5	3	1	1
Chemical and allied products..............	1	0	1	0
Paper and allied products................	1	1	0	0
Total..................	7	4	2	1

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{35}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	18	7	11	0	11	7	0
Industrial	4	—	—	4	—	1	3

Table F_{35}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{35}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**14	30,590	—
Enlargement or additions to existing plant	***5	21,600	—
Replace existing plant	2	1,950	—
No project required	[1]7	10,415	3
Undetermined	[2]2	3,900	4

*The needs set forth in this table are based on presently available information. However future studies and evaluations may result in some changes in these needs.

**Five plants classified as unsatisfactory in capacity, have been considered to need four new plants rather than replacements. One of these new plants is to treat sewage from two of the five unsatisfactory plants.

***Includes repair of one unsatisfactory plant and one plant now satisfactory as to adequacy, requiring additions in order to provide for a higher degree of treatment.

[1] One municipality without treatment facilities is classified as requiring no project, since the disposal of its waste is considered satisfactory at the present time. Includes two municipalities for which no population figures are available.

[2] Project requirements at two municipalities have not been determined at the present time.

Table H_{35}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	17	2
Abatement ordered	--	--
Plans under preparation	3	--
Final plans approved	--	--
Construction awaiting financing	2	--
Under construction	--	--
Status undetermined	2	2

Table I35. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Brundige	1,500	New plant	--
Clayton	1,100	Repair existing plant	--
Clio	400	Additions to plant	--
Dothan	16,500	Additions to plant	--
Fertilizer plant	Not known	Undetermined	--
Elba	1,900	Undetermined	--
Enterprise (#1)	2,500	New plant	Plans under preparation
(#2)	2,500	Additions to plant	Plans under preparation
Floralla	1,200	New plant	--
Geneva	2,000	Undetermined	--
Hartford	1,200	Replace existing plant	--
Headland	450	New plant	--
Midland City:			
Meat products	450	Undetermined	--
Ozark	2,500	New plant	--
Samson	1,500	New plant	--
Slocomb	750	Replace existing plant	--
Troy	4,500	New plant	--
Troy State Teachers College	1,100	Addition to plant	--
FLORIDA			
Bonifay	800	New plant	--
Chipley	2,100	New plant	To handle wastes from two outfall sewers. Construction awaiting financing.
Milk plant	Not known	Undetermined	--
Defuniak Springs	2,000	New plant	Plans under preparation
Graceville	840	New plant	--
Lynhaven	200	New plant	Abatement ordered. Construction awaiting financing.
Panama City	10,500	New plant	--
Paper mill	Not known	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

PERDIDO-ESCAMBIA RIVER SUB-BASIN

General Description

The Perdido-Escambia River Sub-Basin is bounded on the north by the Tallapoosa River Sub-Basin, on the east by the Choctawhatchee River Sub-Basin, on the south by the Gulf of Mexico, on the west by the Mobile Bay Area Sub-Basin, and on the northwest by the Alabama River Sub-Basin. The sub-basin comprises an area of 7,935 square miles, of which 5,282 are in Alabama, and 2,653 lie in Florida.

The drainage of the sub-basin is accomplished by four principal rivers, all rising in southern Alabama, and a number of small coastal streams. These principal rivers are the Perdido on the west, which forms part of the Alabama-Florida State boundary and has a water-shed area of 1,110 square miles; the Escambia, which with its chief tributary, the Conecuh, drains an area of 4,240 square miles; the Blackwater, with a water-shed of 850 square miles; and in the eastern part of the sub-basin, the Yellow, which has a drainage area of 1,385 square miles. The entire area lies within the Coastal Plain and is characterized by low rolling clay hills with comparatively high bluffs along the water courses.

The mean annual rainfall varies from about 53 inches in the northern part of the sub-basin to approximately 58 inches at the coast. Inland from the coast approximately 20 miles, however, the rainfall averages about ten inches greater annually. A 13-year record at the U.S. Geological Survey gauge on the Escambia River at Century, Fla., where the drainage area is 3,700 square miles, indicates the average flow to be 6,841 cubic feet per second. A maximum flow of 73,900 cubic feet per second, and a minimum flow of 810 cubic feet per second have been recorded there.

The Perdido-Escambia Sub-Basin has a climate which is typically temperate and humid. The mean annual temperature varies from about 65°F. in the north to nearly 68°F. at the coast. The frost free season varies from 250 to 300 days.

Economic Development

The sub-basin population according to the 1940 census was approximately 281,905, of which 21 percent was urban. The preliminary 1950 census indicates the population to be 322,465, and the urban population to have increased to 27 percent of the total. In 1950 there were nine urban communities in the area, seven of them in Alabama and the remainder in Florida, having a total population of 146,654. The principal urban community in the sub-basin is Pensacola, Fla., which has a population of 43,293.

The sub-basin is principally agricultural, producing peanuts, cotton, corn, truck crops, tung oil, satsumas, hogs and cattle. The Perdido River Valley is a large producer of white potatoes. Butler, Conecuh and Escambia Counties in Alabama are important strawberry growing centers. The flat lands along the coast are largely uncleared and are used mostly for timber production and livestock raising. The wildlife resources of the area are reported to be extensive.

The major industry of the area is lumbering together with associated activities. Pensacola, Fla. is the chief industrial center of the area, where there are several fertilizer plants, a number of lumber mills, a creosote manufacturing plant, and a paper mill.

Pensacola ranks as one of the most important seaports on the eastern Gulf Coast, exporting coal and general merchandise and importing fruits and fertilizers. Shipbuilding and repair shops exist there, and it provides harborage for an extensive fishing fleet.

Use of Water Resources

The area is well supplied with both surface and ground waters. None of the 30 municipal water supplies in the sub-basin, which serve a population of 120,665, are taken from surface sources.

Two dams have been built on the Conecuh River in Alabama for hydroelectric purposes, the dam at Gantt impounding an area of 1,600 acres and one at River Falls creating a 600-acre reservoir. Both are utilized extensively for swimming, boating and fishing.

The surface water resources of the area have been utilized primarily for sport and commercial fishing, oyster production, and swimming, particularly along the Gulf Coast where a number of fine beaches have been developed.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{36} through I_{36}, inclusive.

Twenty-three municipalities with a sewered population of 101,660, and one municipality for which the number of persons served by sewers is unknown, discharge polluting effluents to watercourses of the sub-basin.

Sixteen industries discharge wastes directly to watercourses. One industry discharges wastes with a population equivalent of 88,000, eleven discharge organic wastes of unknown amount, and four inorganic or wastes of undetermined type and strength.

Eleven of the twenty-four municipalities have 14 primary treatment plants which serve a population of 73,750. Two municipalities have secondary treatment plants serving 5,450 people and the population served by a third with the same treatment is not available for inclusion in this report. Ten communities serving a population of 20,500, five of which have multiple outlets; have no treatment. Of the sixteen industrial plants in the sub-basin, one provides treatment, two have no treatment facilities, and the facilities of thirteen are undetermined.

The design capacity of six municipal treatment plants is satisfactory, ten are unsatisfactory and one is undetermined. Operation of 13 is satisfactory, three are unsatisfactorily operated, and the operation of one remains unclassified. The one industrial waste treatment plant is unsatisfactory in capacity but is satisfactorily operated.

There were two municipal treatment plants having a design population of 6,500 constructed during the period 1946-49, but no industrial waste treatment plants were constructed during that period. Thirteen new municipal treatment plants to serve a population of 21,550 and one new industrial waste treatment plant are required. Enlargements or additions are required to three municipal plants to serve 42,400 people, and to one industrial plant. Two municipal plants serving 7,500 people should be replaced. No project is required at seven municipalities with a population of 25,800 or at one whose population is unavailable. The requirements of six municipal treatment plants and 13 industrial plants are undetermined.

Plans are being prepared at one municipality for construction of waste treatment facilities. No formal action has been taken toward the correction of municipal or industrial pollution in other instances where needed.

Table A_{36}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	16	37,760	31,985
Having population data available (Data on pollution load to watercourse incomplete or not available)	7	63,900	Not applicable
Total	***24	101,660	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Includes one municipality for which no population served figure is available.

Table B_{36}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	88,000
Producing organic wastes	11	Undetermined
Producing inorganic wastes	2	Not applicable
Producing wastes of undetermined type	2	Undetermined
Total	16	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C$_{36}$. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	11	14	75,750
Secondary	**3	3	5,400
No treatment	***10	--	20,510

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to a watercourse.

**Includes one municipality for which no population served figures are available.

***Five of these 10 municipalities have two outfalls each.

Table D$_{36}$. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	7	1	2	4
Textile mill products.....	1	—	—	1
Paper and allied products.	2	—	—	2
Chemical and allied products...............	6	—	—	6
Total................	16	1	2	13

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E$_{36}$. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	17	6	10	1	13	3	1
Industrial	1	0	1	0	1	0	0

Table F_{36}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of waste treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	1	4,500	0	--
1948	1	2,000	0	--
1949	0	--	0	--

Table G_{36}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**13	21,550	1
Enlargement or additions to existing plant	***3	42,400	1
Replace existing plant	2	7,500	--
No project required	[1]8	25,800	1
Undetermined	[2]6	4,410	13

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions five plants at three municipalities with plants classified as unsatisfactory in capacity have been considered to require new plants rather than replacements. Three municipalities each require two new plants.

***One plant, now satisfactory as to adequacy, requires enlargement in order to provide for a higher degree of treatment.

[1] One municipality without treatment, one whose plant is classified as unsatisfactory in capacity, and one whose plant has been classified as undetermined in relation to capacity have been considered to require no project since the disposal of their wastes is considered satisfactory at the present time.

[2] Needs are undetermined for two municipalities having two outfalls each.

Table H_{36}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	23	15
Abatement ordered	0	0
Plans under preparation	1	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

Table I_{36}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Andalusia	7,500	Replacement of 2 existing plants	--
Meat packing plant	450	New plant	--
Meat packing plant	850	Addition to plant	--
Atmore Prison	1,000	New plant	--
Brantley	1,000	Undetermined	--
Brewton	2,200	Two undetermined	Two outfall sewers
Evergreen	3,250	Three new plants	Have three septic tanks at present
Flomaton	1,010	Two undetermined	Two outfall sewers
Foley	1,400	Additions to existing plant	--
Georgiana	1,000	Additions to existing plant	--
Greenville	6,000	Two new plants	Two outfall sewers
Lockhart	200	Undetermined	
Luverne	1,600	New plant	--
Opp	2,500	Two new plants	Two outfall sewers
Robertsdale	700	New plant	--
Troy	4,500	Two new plants	Two outfall sewers
Meat packing plant	525	Undetermined	--
FLORIDA			
Cantonment:			
Paper and allied products industries	88,000	Two undetermined	--
Crestview	2,000	New plant	
Pensacola	40,000	Enlargement and addition to existing plant	Plans under preparation
Brewing industries	Not known	Two undetermined	--
Chemical and allied products industries	Not known	Six undetermined	--
Dairies	Not known	Two undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in changes in these needs.

**Population equivalent for industry.

TALLAPOOSA RIVER SUB-BASIN

General Description

The Tallapoosa River Sub-Basin is bounded on the north and west by the Coosa River Sub-Basin, on the east by the Chattahoochee River Sub-Basin, and on the south by the Alabama and Perdido-Escambia River Sub-Basins. The drainage area of the sub-basin is about 4,600 square miles of which 607 square miles lie in Georgia.

The Tallapoosa River rises in Carroll County and flows in a winding course to its confluence with the Coosa River where the two form the Alabama River in central Alabama. Principal tributaries are the Little Tallapoosa, Hillabee Creek, Sandy Creek, Sougahatchee, Uphapee Creek, Calebee Creek, and Oakfuskee Creek.

The total length of the main river is 268 miles of which the upper 50 miles are in Georgia. The upper part of the sub-basin is a plateau area in northwestern Georgia and eastern Alabama, comprised mostly of low hills with elevations of less than 1,250 feet. The drainage basin includes a part of the Cheaha Mountains with elevations as high as 2,400 feet. The river below Tallassee, Ala. flows through the Coastal Plain.

The mean annual rainfall in the sub-basin is about 54 inches. A 19-year record at the U.S. Geological Survey gauge below Tallassee, Ala., with a drainage area of 3,320 square miles, shows the average discharge at this point to be 4,809 cubic feet per second. Flows at this point have been regulated by Alabama Power Company dams on the main river. The maximum flow recorded was 115,000 cubic feet per second, and the minimum was ten cubic feet per second.

The factors controlling the climate of the sub-basin are geographic position and elevation. The annual mean temperature for the northern part of the sub-basin is about 60°F., while that near the mouth of the river is 65°F. The frost free growing season varies in length from 198 days in the north to 233 days for the southern part.

The 1940 census indicates there were approximately 219,142 persons living in the sub-basin, of which 82 percent were living in Alabama. The preliminary 1950 census indicates a population of 223,462 in the sub-basin.

Economic Development

There are eight urban communities within the sub-basin, two in Georgia, and six in Alabama. The urban 1950 population of the eight municipalities was 57,693, approximately twenty-six percent of the total sub-basin population.

The sub-basin has developed from an agricultural area into one with a combined agricultural and industrial economy. The Piedmont, Lower Coastal Plain, and Black Belt soils of the sub-basin produce a diversity of crops. Nearly one-half of the land in the Alabama portion of the area is in forest. Pulp wood is an important product of these forests.

The principal field crops of the area are cotton, corn, and hay. Produce is also grown for home use. There has been an increase in cattle raising, both beef and dairy, especially in the Black Belt area which is especially suited to pastures.

The principal type of industry in nine of the fifteen counties is the textile industry which employs over half of the industrial force in the sub-basin. Textile mills are located at Carrollton, Tallapoosa and Temple in Georgia, and Alexander City, Opelika, Pepperell, Roanoke, and Tallassee in Alabama. The lumber and wood products industry has the largest number of establishments in the area with 60 in Alabama and 15 in Georgia. The apparel and finished textile products group has 15 establishments and there are 43 food processing plants. These four leading industrial groups utilize forest and agricultural products of the sub-basin.

Use of Water Resources

In general the ground water of the sub-basin is limited as a source of public water supply. There are 31 public water supplies in the sub-basin. Surface water is the source for 21 supplies which serve 83,925 people, 84 percent of those served by all public supplies.

A variety of recreational facilities exist in the area. Chewacla State Park in Alabama with a small lake provides facilities for swimming, boating, fishing and camping. A recently constructed lake near Delta, Ala., provides similar facilities as do Lake Martin and several river sites in Georgia.

Three hydro-electric plants are operated by the Alabama Power Company on the Tallapoosa River. Martin Dam, located north of East Tallassee is capable of storing over 1,600,000 acre feet of water, and has an area of approximately 64 square miles. Thurlow and Yates Dam are located farther down stream and are smaller. Several suitable sites for future dam construction exist in the upper part of the sub-basin.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{37} through I_{37}, inclusive. The Georgia Water Pollution Control Agency has not furnished the Southeast Drainage Basins Office complete information on pollution and pollution control in that part of this sub-basin which lies in the State of Georgia. The incomplete data for the Georgia municipalities and industries presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

There are 25 municipal sources of pollution in the sub-basin. In Alabama, 22 of these are contributed to by a population of 60,120, and discharge an effluent after treatment having a population equivalent of 44,975. The pollution discharged to watercourses of the sub-basin by the three Georgia municipalities having sewage systems serving 9,800 persons is undetermined.

Three industrial establishments in Alabama discharge wastes of an organic nature amounting to a population equivalent of 38,000. The amount of pollution from nine industries located in the Georgia portion of the sub-basin, which are normally considered to discharge wastes with pollution characteristics and which may or may not have separate outlets, is undetermined.

Existing treatment facilities in the sub-basin consist of 15 primary treatment plants at 13 municipalities serving a population of 29,900 and four secondary treatment plants at four communities which serve a population of 8,400. Ten municipalities having a population of 32,585 discharge domestic sewage without treatment.

No treatment facilities are provided at the three industrial establishments in Alabama that produce textile mill products. No information as to the treatment facilities provided at the nine industrial establishments in Georgia, which may or may not discharge wastes directly to a watercourse, has been furnished by the Georgia Water Pollution Control Agency.

Six of the sixteen municipal sewage treatment plants in Alabama are reported as adequate with relation to capacity, and 12 are satisfactorily operated. The Georgia Water Pollution Control Agency has furnished no information as to adequacy of the three municipal treatment plants in Georgia.

One municipal sewage treatment plant designed to serve 3,000 was completed in 1947. No industrial waste treatment plants are reported as completed during the period 1946 through 1949.

Requirements for municipal sewage treatment plants in the sub-basin consist of eight new plants to serve a population of 21,750, enlargement or addition to eight existing plants serving a population of 24,250 and replacement of one existing plant with a connected population of 3,000. No project is required at four municipalities in Alabama having a total population of 5,610. The requirements at three municipalities in Georgia having a population of 9,800 are undetermined. In Alabama one new industrial waste treatment plant is needed. Requirements at nine industrial establishments in Georgia are undetermined.

In the Alabama portion of the sub-basin one industrial waste treatment plant is under construction and plans are under preparation by one municipality for sewage treatment. The status of municipal and industrial treatment works projects in Georgia has not been reported by the Georgia Water Pollution Control Agency.

Table A_{37}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	22	60,120	44,975
Having population data available (Data on pollution load to watercourse incomplete or not available)	***3	9,800	Not applicable
Total	25	69,920	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

***Georgia municipalities.

Table B_{37}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	3	38,000
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	**9	Undetermined
Total	12	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

Table C_{37}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	15	29,925
Secondary	4	4	8,410
No treatment	**10	--	31,585

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two municipalities also with primary treatment.

Table D_{37}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities**	Undetermined facilities
Food and kindred products..................	1	--	--	1
Textile mill products.....	6	--	3	3
Chemical and allied products..................	4	--	--	4
Rubber products..........	1	--	--	1
Total.................	12	--	3	***9

*Industries having separate outlets and discharging wastes directly to watercourse.

**Information for the three plants in Alabama furnished by the Alabama Water Improvement Advisory Commission.

***Industries (only those types normally considered to discharge wastes with pollution characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets.

Table E_{37}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	19	6	10	3	12	4	3
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{37}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	1	3,000	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{37}. Requirements for municipal and industrial waste treatment plants*

Requirements**	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	***8	21,750	1
Enlargement or additions to existing plant	8	24,250	—
Replace existing plant	1	3,000	—
No project required	[1]4	5,610	—
Undetermined	[2]9	15,310	11

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**No information for Georgia portion of subbasin as to project requirements.

***Includes two new plants at each of two municipalities not having treatment facilities. One new plant is to treat sewage from a plant now classified as unsatisfactory in operation.

[1] Due to local conditions one municipality is classified as requiring no project since disposal of its waste is satisfactory at present.

[2] Includes three plants classified as satisfactory in capacity for which no determination has been made as to whether additional requirements are necessary. Includes three Georgia municipalities.

Table H_{37}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	21	2
Abatement ordered	—	—
Plans under preparation	1	—
Final plans approved	—	—
Construction awaiting financing	—	—
Under construction	—	1
Status undetermined*	4	9

*The Georgia Water Pollution Control Agency has furnished no information as to status of projects.

Table I37. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Alexander City	14,000	Addition to plant	—
Two textile mills	10,000	Two undetermined	—
Ashland	700	Additions to two plants	—
Auburn	15,300	Two new plants	—
Camp Hill	650	New plant	—
Dadeville	1,000	New plant	—
East Tallassee	150	Undetermined	—
LaFayette	300	Additions to plant	—
Avondale mill village	250	Undetermined	—
Martin Dam	75	Undetermined	—
Pepperell mill village	1,250	Additions to plant	Planning connection to Opelika's new plant
Textile mill	28,000	New plant	Under construction
Prison No. 4	360	Undetermined	—
Roanoke	3,300	Two new plants	—
Tallassee	2,850	Undetermined	—
Tallassee mill village	1,825	Undetermined	—
Tuskegee Institute	5,000	Additions to two plants	—
Tuskegee	1,500	Two new plants	—
Union Springs	3,000	Replace plant	—
Veterans Hospital (Tuskegee)	3,000	Enlarge plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for completion of this table.

**Population equivalent for industry.

COOSA RIVER SUB-BASIN

General Description

The Coosa River Sub-Basin is bounded on the north by the Tennessee River Basin, on the east by the Chattahoochee and Tallapoosa River Sub-Basins, on the south by the Alabama River Sub-Basin and on the west by the Cahaba and Warrior River Sub-Basins. The sub-basin comprises an area of 10,286 square miles, of which 5,407 are in Alabama, 4,779 are in Georgia and 100 in Tennessee.

The Coosa River is formed by the confluence of the Oostanaula and Etowah Rivers at Rome, Ga. The River flows approximately 286 miles to its junction with the Tallapoosa River, some 15 miles above Montgomery, Ala. where these rivers form the Alabama River.

The Etowah and Oostanaula Rivers rise within the Blue Ridge Mountain Province of northwest Georgia and southeastern Tennessee and flow through low hills with elevations of less than 1,250 feet. There are, however, areas where the elevations exceed 3,000 feet. A small section of the sub-basin drained by Little River, which enters the Coosa below Rome, Ga., lies in the Appalachian Plateau Province. In its course, the Coosa traverses an extensive area of the Appalachian Valley and Ridge Province, a small belt of the Piedmont Province, and continues into the Coastal Plain. The sub-basin thus includes portions of five major physiographic provinces. In general, river slopes are relatively steep.

Mean annual rainfall varies from about 48 inches in the north-central part of the sub-basin to 55 inches in the central part of the sub-basin and to 52 inches in the southern end of the sub-basin. A 23-year average at the U.S. Geological Survey gauge located at the Alabama Power Company's Jordan Dam, having a drainage area of 10,200 square miles, shows the average discharge to be 15,890 cubic feet per second. A maximum flow recorded at this point was 298,000 cubic feet per second, and the regulated minimum flow recorded was 54 cubic feet per second.

The Coosa Sub-Basin has a warm moist climate with relatively mild winters and long hot summers. The mean annual temperature varies from about 60°F. in the north to 65°F. in the south. The frost free season varies from 193 days in the northern valleys to 242 days in the southern part of the area. Droughts are uncommon during the growing season and rainfall is adequate for the needs of agriculture.

The sub-basin population according to the 1940 census was approximately 589,481, of which 30 percent was urban. The preliminary 1950 census indicates the sub-basin population to be 662,431.

Economic Development

The 1950 preliminary census report showed the sub-basin urban population to be 228,765, or approximately 35 percent of the total, distributed among 12 communities in Alabama and ten in Georgia. The urban municipalities in Alabama account for 63 percent of the total urban population.

Resources of the sub-basin include an adequate surface water supply, limited deposits of iron, coal, and limestone, and other minerals, and extensive acres of forest land. The soils of the sub-basin are highly erodable and of mediocre quality.

The Coosa sub-basin is both an agricultural and industrial area. The major agricultural products are cotton, corn, truck crops, cattle, and dairy products and timber. Major industrial activities include the production of textiles and apparel, steel products, paper products, rubber products, cast iron pipe, chemicals and tractor assembly works.

Use of Water Resources

There are 66 public and numerous industrial water supplies in the Coosa River Sub-Basin. Twenty-one communities with a total population of 144,255, obtain water from the Coosa River or its tributaries.

A number of headwater streams which rise in the mountains have been stocked with several species of trout and provide a certain amount of sports fishing. Reservoirs in the sub-basin, in general, possess good recreational potentialities. Existing reservoirs, except for the recently completed Allatoona, are private developments the shores of which are almost completely in private ownership. They are, however, available for some public recreational use. Some commercial fishing has been carried on in the Coosa River.

Hydroelectric development in the sub-basin is quite extensive. On the Coosa River the Lay and Mitchell Dams in Chilton County, Alabama, impound 6,700 acres and 5,800 acres of water, respectively, and Jordan Dam above Wetumpka, Ala. impounds 4,900 acres. Allatoona Dam on the Etowah River near Cartersville, Ga., forms a reservoir of 15,700 acres. A fifth dam is proposed for

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construction on the Coosa River at Howell Mill Shoals in northeastern Alabama. No water commerce has been reported on the Coosa River since 1940.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{38} through I_{38}, inclusive. The Georgia Water Pollution Control Agency has not furnished the Southeast Drainage Basins Office complete information on pollution and pollution control in that part of this sub-basin which lies in the State of Georgia. The incomplete data for the Georgia municipalities and industries presented in the following tables have been obtained from several sources, a discussion of which is included in the Savannah River Sub-Basin Report.

There are 31 municipal sources of pollution in Alabama, whose collecting systems serve a population of 135,600, and discharge pollution with a population equivalent of 104,700. Data concerning the amount of pollution discharged by 20 communities in Georgia, having a population of 48,200, has not been furnished this office by the State Water Pollution Control Agency.

Ten industries in Alabama producing organic wastes discharge pollution with a population equivalent of 55,100 directly to a watercourse. The types of waste and amount of pollution discharged by the 33 industries located in the Georgia portion of the sub-basin, which may or may not have separate outlets, have not been supplied this office by the Georgia Water Pollution Control Agency.

Twenty-two municipalities have 25 primary sewage treatment plants serving a population of 22,700. Fourteen secondary treatment plants at 12 municipalities serve a population of 50,700. No treatment facilities are provided for 110,500 persons at 19 municipalities.

Information furnished by the Alabama Water Improvement Advisory Commission regarding existing treatment facilities for the ten industrial establishments in Alabama indicates no treatment of their wastes. Industrial waste treatment facilities for 33 industrial plants in Georgia have not been reported to this office by the Georgia State Water Pollution Control Agency.

No report as to the adequacy with relation to capacity or operation for the 18 municipal sewage treatment plants in Georgia has been furnished this office. In Alabama 11 plants are adequate with relation to capacity and ten are considered inadequate. Nineteen plants in Alabama are operated satisfactorily and two are in need of improved operation.

Two new domestic sewage treatment plants were placed in operation during 1947 serving a total population of 7,300. No industrial waste treatment plants are reported as being placed in operation during the period 1946 through 1949.

Requirements to abate pollution existing in the sub-basin are three new municipal sewerage treatment plants serving a population of 36,900, one new industrial waste treatment plant, additions at eight municipal treatment plants serving 9,900 persons and replacement of one existing plant serving a population of 1,200. These required projects are in the State of Alabama. Requirements for industrial waste and domestic sewage treatment in Georgia are listed as undetermined since the Georgia Water Pollution Control Agency has not submitted this information.

Table A_{38}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	31	135,645	104,695
Having population data available (Data on pollution load to watercourse incomplete or not available)	[1]20	48,190	Not applicable
Total	[2]53	183,835	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

[1] Georgia municipalities.

[2] Includes 2 mill villages for which no population data are available.

Table B_{38}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	10	55,125
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	**33	Undetermined
Total	43	—

*Industries having separate outlets and discharging wastes directly to watercourse.

**Industries (only those types normally considered to discharge wastes with polluting characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Manufacturers of Georgia", prepared by the Georgia Agricultural and Industrial Development Board and supplemented by information from the Georgia State Department of Commerce.

The status of treatment works projects to abate pollution in Georgia has not been furnished for use in this report by the State Water Pollution Control Agency. Alabama reports plans are under preparation at one municipality for an addition to a plant serving 1,150. No formal action has been taken with the remaining municipalities and industries discharging wastes to the streams of the sub-basin and which require treatment works projects.

Table C_{38}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	**22	25	22,670
Secondary	12	14	50,675
No treatment	19	—	110,490

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes two mill villages for which no population data are available.

Table D_{38}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities **	Undetermined facilities
Food and kindred products..	9	—	—	9
Textile mill products......	16	—	9	7
Chemical and allied products................	16	—	—	16
Primary metals industry....	1	0	1	0
Miscellaneous..............	1	—	—	1
Total.................	43	—	10	***33

*Industries having separate outlets and discharging wastes directly to watercourse.

**Information for the ten plants in Alabama portion of sub-basin furnished by the Alabama Water Improvement Advisory Commission.

***Industries (only those types normally considered to discharge wastes with pollution characteristics) located in the Georgia portion of the sub-basin, which may or may not have separate outlets.

Table E_{38}. Adequacy of existing treatment facilities*

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	39	11	10	18	19	2	18
Industrial	--	--	--	--	--	--	--

*The Georgia Water Pollution Control Agency has furnished no information as to adequacy of plants with relation to capacity or operation.

Table F_{38}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	2	7,250	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{38}. Requirements for municipal and industrial waste treatment plants*

Requirements**	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	3	36,850	1
Enlargement or additions to existing plant	***8	9,900	--
Replace existing plant	[1]1	1,200	--
No project required	[2]12	35,775	2
Undetermined	34	100,110	40

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**No information for Georgia portion of subbasin as to the projects required.

***Includes three plants for one municipality.

[1] Due to local conditions, one municipality with a plant classified as undetermined in capacity has been considered as requiring a replacement.

[2] Three municipalities not having treatment are classified as requiring no project since the disposal of their waste is considered satisfactory at the present time.

Table H_{38}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	22	9
Abatement ordered	--	--
Plans under preparation	1	--
Final plans approved	--	--
Construction awaiting financing	--	--
Under construction	--	--
Status undetermined*	23	32

*No information for Georgia portion of subbasin as to status of projects to abate pollution.

Table I_{38}. Project list - municipalities and industries requiring improvements for abatement of pollution*+, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Anniston-Oxford	33,200	New plant	--
Ashville	250	Undetermined	--
Attalla	5,000	Undetermined	--
Textile mill	900	Undetermined	--
Bemiston	1,100	Additions to plant	--
Blue Mountain:			
Thread manufacturing company	375	New plant	--
Bon Air	400	Undetermined	--
Calera	750	Additions to plant	--
Center	750	Undetermined	--
Clanton	3,000	New plant	--
Columbiana	1,150	Additions to plant	Plans under preparation
Ft. McClellan	500	Undetermined	--
Ft. Payne:			
Textile mill	500	Undetermined	--
Gadsden	40,000	Two undetermined	--
Steel industry	35,000	Undetermined	--
Goodwater	650	New plant	--
Jacksonville	1,600	Additions to plant	--
Jordan Dam	70	Undetermined	--
Pell City	800	Additions to plant	--
Textile mill village	1,200	Replace existing plant	--
Textile mill	4,200	Undetermined	--
Piedmont	4,500	Additions to 3 plants	--
Springville	350	Undetermined	--
Sycamore	1,200	Undetermined	--
Sylacauga:			
Textile mill	11,000	Undetermined	--
Talladega:			
Textile mill	1,750	Undetermined	--
Tutwiler Prison	350	Undetermined	--
Wetumpka	2,350	Undetermined	--
Textile mill	1,100	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

+The Georgia Water Pollution Control Agency has not made available the information necessary for the completion of this table.

**Population equivalent for industry.

CAHABA RIVER SUB-BASIN

General Description

The Cahaba River Sub-Basin is bounded on the north and west by the Warrior River Sub-Basin, on the east by the Coosa River Sub-Basin, and on the south by the Alabama River Sub-Basin. The drainage area of the Cahaba River is approximately 1, 870 square miles and lies wholly within the State of Alabama. The river flows 108 miles in a southwesterly direction to the fall line near Centerville where it drops to the coastal plain. It then flows in a southerly direction for 87 miles to its junction with the Alabama River seventeen miles below Selma. Headwaters of the river are in low hills which attain elevations of over 1, 500 feet. The slope of the river decreases from 7. 7 feet per mile in the upper reaches to 1. 5 feet per mile at its mouth.

The sub-basin has a warm moist climate with mild winters and long hot summers. The average annual rainfall at Centerville is about 56 inches. Twenty-year average discharge at the Centerville U.S. Geological Survey gauge is 1, 634 cubic feet per second. The maximum discharge during this period was 82, 800 cubic feet per second and the river has reached a low flow of 90 cubic feet per second. The mean annual temperature at this point is 64° F. The frost free season varies from 210 to 230 days per year.

The total estimated population of the sub-basin in 1940 was 93, 448 and the preliminary 1950 census indicates a total population of 112, 091.

Economic Development

The estimated 1950 urban population of 18, 542 is distributed between Homewood and Leeds. There are ten incorporated non-urban communities whose population is included in the 1950 estimate of 93, 549 rural persons.

The principal resources of the sub-basin are fertile soils in the lower part and coal and timber in the upper part of the sub-basin. The Cahaba River Valley has been developed both as an agricultural and industrial area. The major agricultural products are corn, cotton, cattle, and dairy produce. The portion of the sub-basin below Centerville, which is in the upper Coastal Plain and Black Belt, is the major agricultural area. The most important industries are coal mining and lumbering together with their associated activities.

Use of Water Resources

Public water supply is one of the important uses of the water resources of the Cahaba Sub-Basin. Only five of the 26 public water supplies in the area are from surface water, but these five serve approximately 95 percent of the 428, 550 persons using either surface or ground public supplies. Included in the public water supplies is the Birmingham Water Works, Cahaba Plant, which serves approximately 400, 000 residents of metropolitan Birmingham, located in the Warrior River Sub-Basin. The major portion of the Birmingham water does not return to the Cahaba River but is diverted to the Warrior River Sub-Basin. Much of the industrial activity at Birmingham receives water from the municipal supply. Livestock watering is an important use in the lower part of the sub-basin.

Fishing and boating on Lake Purdy, an impoundment for the Birmingham water supply and the only impoundment of any significance in the sub-basin, and fishing, swimming, and boating in Oak Mountain State Park are the only major recreational activities in the area.

There is no commercial fishing of consequence in the sub-basin and no dams for power development, flood control or navigation exist on the river.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{39} to I_{39} inclusive.

There are eight sources of municipal pollution contributed to by a population of 25, 300 people. The amount of pollution discharged to the watercourses in terms of equivalent number of people is reduced to 15, 700 by treatment. No industries discharging damaging wastes directly to a watercourse are reported in the sub-basin. Coal mine drainage in the upper portion of the sub-basin has no apparent serious effect on the quality of the water.

Five of the eight municipal sources of pollution have treatment facilities consisting of four primary treatment plants at three municipalities and secondary treatment plants at two municipalities. Primary treatment serves 19, 300 persons and secondary treatment is given to the sewage collected from 3, 300 people. Of the six existing treatment plants two are reported adequate with relation to capacity and four are inadequate. Operation of the six treatment plants is considered to be satisfactory.

Requirements for municipal waste treatment plants are four new plants to serve 2,700 persons and four enlargements or additions to existing plants to serve 19,300 people. Two of the new plants are required at one municipality. No new municipal treatment plants have been constructed during the period 1946 through 1949. No formal action has been taken with the municipalities requiring projects to abate pollution but plans are being prepared for an addition to the Jefferson County, Alabama, Shades Valley Plant serving approximately 17,000 persons in the Birmingham area.

Table A_{39}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	8	25,300	15,700
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	---	Not applicable
Total	8	25,300	---

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to a watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{39}. Sources of pollution, industrial

Industries*	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes		
Producing organic wastes		
Producing inorganic wastes		
Producing wastes of undetermined type		
Total		

*No industries reported as discharging wastes directly to watercourse.

Table C_{39}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	3	4	19,300
Secondary	2	2	3,300
No treatment	3	--	2,700

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{39}. Existing treatment facilities, industrial

Type industry*	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities

*No industries reported as discharging wastes directly to watercourse.

Table E_{39}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	6	2	4	0	6	0	0
Industrial	0	--	--	--	--	--	--

Table F_{39}. Progress in pollution abatement

Year	Municipal		Industrial*	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--		--

*No industries discharging wastes directly to a watercourse are reported.

Table G$_{39}$. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial**
	Number	Population served by facilities	Number
New plant	***4	2,700	0
Enlargement or additions to existing plant	4	19,300	0
Replace existing plant	0	--	0
No project required	2	3,300	0
Undetermined	0	--	0

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**No industries discharging wastes directly to a watercourse are reported.

***One municipality requires two new plants.

Table H$_{39}$. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial*
No formal action	7	0
Abatement ordered	0	0
Plans under preparation	1	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

*No industries discharging wastes directly to a watercourse are reported.

Table I$_{39}$. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served	Project requirements	Remarks
ALABAMA			
Irondale............	1,300	Addition to plant	--
Jefferson County, Shades Valley Plant............	17,000	Addition to plant	Plans under preparation
Marion (No. 1)............	500	New plant	--
(No. 2)............	350	New plant	--
Montevallo............	1,000	New plant	--
Alabama College............	850	New plant	--
Siluria............	500	Addition to plant	--
Textile mill village............	500	Addition to plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

ALABAMA RIVER SUB-BASIN

General Description

The Alabama River is formed by the confluence of the Coosa and Tallapoosa Rivers, 15 miles above Montgomery, Ala. The sub-basin is bounded on the north by the Tallapoosa, Coosa and Cahaba River Sub-Basins, their rivers being the major tributaries of the Alabama River; on the east and south by the Perdido-Escambia River Sub-Basin and on the west by the Lower Tombigbee River Sub-Basin. The river ends at its junction with the Tombigbee to form the Mobile and Tensaw Rivers some 45 miles above Mobile. The total length of the Alabama River is approximately 320 miles and the sub-basin comprises about 5,775 square miles wholly within the State of Alabama. The drainage area of the Alabama, Coosa, Tallapoosa, and Cahaba Rivers is 22,700 square miles.

The drainage sub-basin consists of broad valleys and low hills, few of which attain an elevation of more than 500 feet. The slope of the river for the first 100 miles from its source is approximately 0.5 feet per mile, below which point it gradually decreases to its confluence with the Tombigbee where the effect of the two-foot tide of Mobile Bay is noticeable at low stages.

The factors controlling the climate of the sub-basin; namely, geographic position, elevation, arrangement of highlands and proximity to the Gulf of Mexico tend generally toward a temperate and equable climate. The annual mean temperature ranges between 65° F. in the north and 66° F. in the south. The growing season varies from 242 days in the north to 246 days in the south. The annual mean rainfall varies from 51 inches at Montgomery to 62 inches in the southern part of the sub-basin. The Alabama ranks thirteenth among the large rivers of the United States in order of the average discharge at the mouth. A 17-year record at Claiborne shows the average daily flow to be 32,320 cubic feet per second, and a maximum flow of 227,000 cubic feet per second has been recorded. The flow is regulated by power projects on both the Tallapoosa and Coosa Rivers and a minimum of 6,000 cubic feet per second is maintained in the river at Montgomery.

The 1940 population in the sub-basin was 280,528. Preliminary 1950 census figures indicate a population increase to 290,303.

The 1940 urban population was 100,582 distributed between Montgomery, Prattville, and Selma. Preliminary figures of the 1950 census indicate that this urban population has increased to 137,890. The rural population of 152,413 includes twelve incorporated communities within the sub-basin.

Economic Development

The principal natural resources of the Alabama Sub-Basin consist of its fertile valleys, large timber resources, and mineral resources of the Coastal Plain. These have led to its chief economic development of farming and lumbering with industrial development in Montgomery, Selma, and Prattville.

The Alabama Sub-Basin has developed from an agricultural area into one of combined agricultural and industrial economy. The agriculture of the sub-basin has changed radically since 1930. Row crop farming has given way to pasture land and the development of the cattle and dairying industry. This is particularly true of the rich Black Belt or prairie soils area of Montgomery, Lowndes, Wilcox, Dallas, and Perry counties where green grazing is possible throughout the year. The livestock terminal market at Montgomery is now the largest east of the Mississippi River and south of the Ohio River. Other major agricultural products are cotton and corn.

South of the Black Belt lie the Coastal Plain and River Flood Plain soils which are well drained and easily tilled. A variety of crops are profitably grown here including cotton, some wheat, oats, sorghum, soy beans, peanuts, pecans, sweet potatoes, and truck crops. Approximately 63 percent of the total area of the sub-basin is in farm lands.

The principal type of industry in 11 of the 16 counties in the area is lumbering, forestry, and the manufacture of wood products. The industry of the sub-basin is so diversified, however, that these account for only one-fourth of the total labor force. Important industries of the urban centers include meat packing, milk processing, textiles and chemicals.

Use of Water Resources

The 12 public water supplies in the sub-basin are all obtained from underground sources. Although the Alabama River Valley is richly supplied with an abundance of ground water, there is some possibility of deficiencies at Montgomery and Selma due to rapidly developing industrial areas. The 12 public ground water supplies are used by a total of 159,385 persons.

Livestock watering on tributaries of the Alabama River is a major water use in the agricultural area of the sub-basin.

The river and its tributaries have not been developed extensively as recreational areas. The limited amount of recreational activities in the area consists of boating and fishing, together with swimming in the tributary streams near centers of population. Commercial fishing is carried on rather extensively throughout the entire length of the river.

Water transportation on the Alabama is of significance although less so than in former years. A four-foot channel at low water is maintained to Selma, and a three and one-half-foot channel to Montgomery. In 1947 a total of 67,064 tons of freight was transported on the river.

A plan for the development of the river for navigation and production of power is under consideration. This plan includes the construction of dams at Claiborne, Millers Ferry, and Jones Bluff.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{40} to I_{40}, inclusive.

Eleven municipalities with a sewered population of 122,275 discharge domestic sewage to the streams of the sub-basin. The total pollution discharged to watercourses, in terms of equivalent number of people, by these communities is 130,075 due to industrial establishments connected to municipal sewers.

Four industries producing organic wastes amounting to 15,100 population equivalent, discharge directly to watercourses. No treatment facilities exist at these industrial establishments.

Four municipalities have a total of five primary treatment plants serving a population of 2,925. Only one of the five municipal waste treatment plants is considered adequate with relation to design capacity, but all five are satisfactorily operated. No plants were constructed and put into operation during the period of 1946 through 1949.

Four new plants serving a population of 59,450 are required to abate pollution in the sub-basin. One municipality with a population of 1,500 requires enlargement of two of its existing plants. No project is required at two municipal sources of pollution having a total connected population of 1,125.

The requirements for three new waste treatment plants to serve three industries producing food and kindred products are undetermined. No project is required at the one textile mill in the sub-basin discharging wastes directly to a watercourse, since the disposal of its wastes by dilution is considered satisfactory at the present time.

No formal action has been taken for construction of municipal or industrial waste treatment plants required to abate pollution.

Table A_{40}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people**
Having data on pollution load discharged to watercourse	11	122,275	130,075
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	Not applicable
Total	11	122,275	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{40}. Sources of pollution industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	4	15,100
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	4	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{40}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	4	5	2,925
Secondary	0	--	--
No treatment	7	--	119,350

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{40}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	3	0	3	0
Textile mill products.....	1	0	1	0
Total................	4	0	4	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{40}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	5	1	4	0	5	0	0
Industrial	0	—	—	—	—	—	—

Table F_{40}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{40}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**4	119,650	—
Enlargement or additions to existing plant	2	1,500	—
Replace existing plant	--	--	--
No project required	***2	1,125	1
Undetermined	5	—	3

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions, one municipality with a plant classified as unsatisfactory in capacity has been considered as requiring a new plant rather than a replacement. Figure also includes one municipality without treatment which is also classified as undetermined for a portion of its sewage.

***One municipality with a plant classified as unsatisfactory in capacity has been classified as requiring no project since the disposal of its waste is considered satisfactory at the present time.

Table H_{40}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	11	--
Abatement ordered	0	—
Plans under preparation	0	—
Final plans approved	0	--
Construction awaiting financing	0	--
Under construction	0	—
Status undetermined	0	3

Table I_{40}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Camden........................	300	New plant	--
Craig Field...................	1,700	Undetermined	—
Kilby Prison and Gunter Field.	8,500	Undetermined	—
Marion........................	1,150	New plant	—
Maxwell Field.................	5,000	Undetermined	—
Monroeville No.1..............	800	Enlarge existing plant	—
No.2..............	700	Enlarge existing plant	—
Montgomery No.1...............	32,000	Undetermined	—
No.2...............	55,000	New plant	—
Packing plant.................	9,000	Undetermined	—
Poultry processing plant....	750	Undetermined	—
Prattville....................	3,000	New plant	—
Selma.........................	13,000	Undetermined	—
Packing plant.................	5,000	Undetermined	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

UPPER TOMBIGBEE RIVER SUB-BASIN

General Description

The Upper Tombigbee River Sub-Basin is bounded on the north by the Tennessee River Basin, on the south by the Lower Tombigbee and Pearl River Sub-Basins, on the east by the Warrior River Sub-Basin, and on the west by the Mississippi River Sub-Basin. The river is formed in northeastern Mississippi by the convergence of a series of small creeks. It flows southeastward approximately 120 miles to the Mississippi-Alabama State line, and continues in Alabama for another 120 miles to its confluence with the Warrior River where it becomes the Lower Tombigbee. The major tributaries are the Noxubee River which rises in Mississippi and the Sipsey River which rises in Alabama.

The total drainage area is about 9,633 square miles of which 5,869 are in northeastern Mississippi and 3,764 are in northwestern Alabama.

The northern part of the sub-basin is bounded by steep hills and valleys. The central and southern part of the sub-basin is flat prairie land. The profile is very flat, aside from the extreme upper reaches of the streams and runs for the most part through the upper coastal plains.

Average annual rainfall is about 53 inches, but distribution is not uniform throughout the year. There are long periods of dry weather and, likewise, extended periods of rain. A 30-yr. record of the U. S. Geological Survey gauge at Columbus, Miss., where the drainage area is 4,490 square miles, shows the average discharge to be 5,791 cubic feet per second. The maximum discharge at this point was 134,000 cubic feet per second and the minimum discharge recorded was 160 cubic feet per second. Records of the gage at Gainesville, Ala., where the drainage area is 8,700 square miles, show a minimum of 389 cubic feet per second for a nine-year period.

The mean annual temperature for this area varies from about 62°F. to 65°F. The average number of frost free days ranges from 200 in the northern portion of the sub-basin to 230 in the south.

The total population of the sub-basin based upon the 1940 census was approximately 388,003. The preliminary 1950 census reports indicate a population of 376,319, a three percent decrease from the 1940 population.

Economic Development

The sub-basin contains eight urban communities which comprise 17 percent of the population. Six of these communities are in Mississippi and two are in Alabama. A total of some 42 incorporated towns are in the sub-basin equally divided between the two States.

Agriculture is the chief occupation of the area and cotton, corn, dairy products, and livestock are the chief products.

The major industries of the sub-basin are lumbering, together with its associated activities, and textile and textile products manufacturing, including apparel and other fabric products.

Use of Water Resources

There are 34 public water supplies in the sub-basin. Aside from Columbus, Mississippi and Fayette, Ala., all public water supplies in the sub-basin are taken from deep wells.

Recreational areas have not been developed on the streams, but fishing, swimming, boating, and hunting of migratory water fowl are engaged in on the streams near the larger communities. There is some commercial fishing on the main river.

The Congress has passed a bill authorizing a project to connect the Tombigbee River with the Tennessee River. A small amount of the estimated cost has been appropriated, and planning has been started.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities, and treatment plant requirements are shown in tables A_{41} through I_{41}, inclusive.

Eleven municipalities with a total sewered population of 9,175 discharge pollution to watercourses of the sub-basin. Treatment at several municipalities reduces this to a population equivalent of 7,705. The amount of pollution discharged to streams by 14 municipalities serving 60,700 has not been determined.

Eleven industries discharge waste directly to streams, two of which produce waste of an undetermined type and nine produce organic waste of an undetermined amount.

Thirteen of the 25 municipalities have primary treatment plants. One of these municipalities has two treatment plants. Population served by the 14 primary treatment plants is 17,150. One municipal secondary treatment plant serves a population of 1,200. Eleven municipalities with a total population of 51,525 have no treatment, and no treatment is provided at any of the 11 industrial plants.

The design capacity of two of the municipal treatment plants is satisfactory, the remaining 13 are considered to be inadequate with relation to capacity. Operation at 13 of the treatment plants is satisfactory and unsatisfactory at the other two.

There have been no municipal or industrial waste treatment plants constructed during the period 1946 through 1949. Requirements for the 11 industrial waste treatment plants are undetermined. Construction of 14 new sewage treatment plants to serve a population of 32,475 and enlargement or additions at six municipal plants serving a population of 8,500 are the known requirements for pollution abatement in the sub-basin. No projects are required at six municipalities having a total population of 27,300. The requirements for one municipality with no treatment are undetermined.

Plans are under preparation at three municipalities for construction of treatment plants. Final plans have been approved for one treatment works project. The construction of one plant is awaiting financing. No formal action has been taken with the other 16 municipalities or the 11 industries for the construction of adequate waste treatment works to abate pollution.

Table A_{41}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	11	9,175	7,705
Having population data available (Data on pollution load to watercourse incomplete or not available)	14	60,700	Not applicable
Total	25	69,875	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{41}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	—	—
Producing organic wastes	9	Undetermined
Producing inorganic wastes	—	Not applicable
Producing wastes of undetermined type	2	Undetermined
Total	11	—

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{41}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	14	17,150
Secondary	1	1	1,200
No treatment	11	--	51,525

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{41}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	9	0	9	0
Chemical and allied products................	1	0	1	0
Lumber and wood products...	1	0	1	0
Total..................	11	0	11	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{41}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	15	2	13	0	13	2	0
Industrial	0	--	--	--	--	--	--

Table F_{41}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	0	--	0	--

Table G_{41}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**14	34,075	--
Enlargement or additions to existing plant	[1]6	8,500	--
Replace existing plant	--	--	--
No project required	[2]6	27,300	--
Undetermined	1	--	11

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes to these needs.

**Includes two new plants for one municipality with no treatment at present. Due to local conditions five municipalities with plants classified as unsatisfactory in capacity have been considered to require new plants rather than replacements.

[1] Includes one municipality that needs additions to both of its existing plants.

[2] Two municipalities with no treatment facilities and two with plants classified as unsatisfactory in capacity have been considered to require no project since the disposal of their wastes is satisfactory at the present time.

Table H_{41}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	16	11
Abatement ordered	0	0
Plans under preparation	3	0
Final plans approved	1	0
Construction awaiting financing	1	0
Under construction	0	0
Status undetermined	0	0

Table I₄₁. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Aliceville	1,700	Two new plants	--
Carrollton	550	New plant	--
Fayette	1,600	Undetermined	--
Guin	700	New plant	--
Haleyville	200	Addition to plant	Plans under preparation
Hamilton	650	Addition to plant	--
Sulligent	825	New plant	--
Vernon	425	Addition to plant	--
Winfield	1,225	Additions to two plants	--
MISSISSIPPI			
Amory	3,500	New plant	--
Booneville	1,500	New plant	Plans under preparation
Cheese plant	Not known	Undetermined	--
Brooksville	—	—	--
Cheese plant	Not known	Undetermined	--
Columbus	—	—	--
Cheese plant	Not known	Undetermined	--
Creosoted timber products	Not known	Undetermined	--
Fulton	1,000	New plant	--
Houston	1,500	New plant	--
Cheese plant	Not known	Undetermined	--
Macon	2,000	New plant	--
Dairy processing plant	Not known	Undetermined	--
Cheese plant	Not known	Undetermined	--
Okolona	2,000	New plant	--
Cheese plant	Not known	Undetermined	--
Starkville	4,000	New plant	Final plans approved
State College	3,200	New plant	--
Tupelo	10,000	New plant	Contract awaiting financing
Evaporated milk plant	Not known	Undetermined	--
Fertilizer plant	Not known	Undetermined	--
Meat packing plant	Not known	Undetermined	--
West Point	6,000	Enlarge plant	Plans under preparation

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industries.

WARRIOR RIVER SUB-BASIN

General Description

The Warrior River Sub-Basin is bounded on the north by the Tennessee River Basin, on the east by the Coosa and Cahaba River Sub-Basins, on the west by the Upper Tombigbee Sub-Basin and on the south by the Lower Tombigbee River Sub-Basin. The main stem of the river is formed by the confluence of Mulberry Fork and Locust Fork, both of which rise in the mountainous area of north central Alabama. The Warrior River flows in a southwesterly direction some 175 miles to its junction with the Tombigbee River at Demopolis, Ala. The Warrior Sub-Basin, including the drainage areas of its source tributaries, comprises approximately 6,245 square miles entirely within the State of Alabama.

The drainage sub-basin is hilly with highest elevations reached in the northern portion. The topography is such as to normally result in flashy stream conditions, but in the vicinity of Birmingham and below, the main stem is canalized by a series of dams and locks and therefore normal stream flow conditions are modified.

There are several impoundments in the sub-basin, consisting of Birmingham's industrial water supply on Blackburn Creek, the Tennessee Coal and Iron Reservoir on Village Creek, Bankhead Lake on the Black Warrior River and the pools formed by 11 navigation dams.

The mean annual rainfall is about 54 inches. A 15-year record at the U.S. Geological Survey gage at Eutaw, Ala. gives the average discharge as 8,866 cubic feet per second. The maximum flow of 134,000 cubic feet per second and a minimum flow of 177 cubic feet per second have been recorded.

The climate of the sub-basin may be described as warm and moist with mild winters and long hot summers. Mean annual rainfall is 54 to 55 inches. The frost free season varies from 210 days in the northern zone to 240 days near the junction with the Tombigbee River.

The total population of the Warrior Sub-Basin in 1940 was 706,819. The preliminary 1950 census reports indicate a population of 795,104.

Economic Development

There are 37 incorporated communities in the sub-basin. The estimated 1950 urban population of the area is 436,526 and is distributed among 14 communities, an increase of five urban municipalities since 1940. The preliminary 1950 census indicates the urban population is 55 percent of the total sub-basin population. The metropolitan Birmingham area has the major portion of this urban population.

The principal natural resources of the Warrior Sub-Basin are coal, iron, and fertile soils in the southern portion.

The Warrior River Sub-Basin is the most highly industrialized basin in Alabama and ranks high among those of the Southeast. Coal and iron mining, steel production, processing of steel products, chemical by-products associated with the production of pig-iron, chemicals, textiles, paper-making, oil refining, and wood preserving comprise the major industries. It is estimated that 90 percent of the coal and iron produced in Alabama comes from this sub-basin.

The more productive agricultural areas of the sub-basin are located in Cullman, Blount, southern Tuscaloosa, Greene, and Hale Counties. Cotton, corn, and truck crops are major agricultural products in the first three counties, while dairying and beef cattle production are the major agricultural interest in Green and Hale Counties, which are partly in the Black Belt soils area. Cullman County is also a large producer of strawberries.

Use of Water Resources

Locust and Mulberry Forks of the Warrior River serve as a source of raw water for 11 communities, the largest being Jasper, a city of 8,558 persons. Located on Blackburn Fork near Inland is a 1,500-acre reservoir which serves as a source of industrial water for metropolitan Birmingham and as a source of raw water for the filtration plant of the Birmingham Water Works Company located near Tarrant City. Another major source of raw water for the City of Birmingham is from the Cahaba River just east of the Warrior River Sub-Basin. A large percentage of the water from the Cahaba River is discharged as sewage to the Warrior Sub-Basin.

Numerous private cottages and commercial fishing camps are located on Bankhead Lake and Locust Fork in Jefferson County. In view of the present pollution load, particularly below the streams which have their sources in the Birmingham area, recreation is limited to boating, and to a small amount of fishing. Prior to the industrialization of the Tuscaloosa area on the Warrior, boating, fishing, and swimming were major sports activities there. The lower reaches of the Warrior have not been developed as recreational areas. There is some commercial fishing in the Warrior and the larger tributaries near the centers of population are used for swimming and fishing.

The Warrior River is canalized from its mouth to Sayre on Locust Fork and to Sipsey on Mulberry Fork. An adequate navigation channel has been made possible by 11 navigation locks and dams. The entire flow of the river, particularly during the summer and fall months, is rigidly regulated for navigation.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{42} through I_{42}, inclusive.

There are 27 sewered municipalities in the sub-basin having a connected population of 386,725. Eleven of these discharge untreated sewage into the streams, while three have secondary and 12 use primary treatment facilities. One additional municipality employs primary treatment for part of its sewage, the remainder is untreated. Approximately one-half of the total connected population in the sub-basin receives treatment at the 17 plants. Of the untreated sewage discharged into the various streams of the sub-basin, ninety-five percent is from the Jefferson County Sanitary District and the city of Tuscaloosa. The industrial waste load discharged to municipal sewers is estimated to have a population equivalent of 42,890, of which thirty percent is discharged into systems where the combined waste is discharged untreated. The total domestic and industrial pollution load of the various municipal systems is estimated to be 429,615. Treatment in the seventeen municipal sewage treatment plants reduces the total pollution load to a population equivalent of 339,150.

Table A_{42}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	27	386,725	339,150
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	—	Not applicable
Total	27	386,725	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

There are nine industries in the sub-basin discharging wastes directly to watercourses. Eight of these industries producing organic wastes discharge pollution with a population equivalent of 251,825. One industry produces inorganic wastes only and five of the organic waste producing industries also produce some inorganic wastes. None of the industries has treatment facilities.

The deleterious effect of pollution, from metropolitan Birmingham and surrounding area on Locust Fork of the Warrior from the mouth of Five-Mile Creek to the mouth of Locust Fork and thence down the Warrior

Table B_{42}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	8	251,825
Producing organic wastes	0	Undetermined
Producing inorganic wastes	**6	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	***9	—

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes five plants also producing organic wastes.

***Total adjusted to correct for duplication noted in footnote marked thus,**.

River to Lock and Dam No. 17 is evident, and confirmed by laboratory analysis. Another major critical area of the Warrior River with respect to pollution is that stretch of the backwater from the lock and dam at Tuscaloosa that extends upstream to the discharge of the first chemical plant located near Holt. This pollution is a combination of industrial waste and domestic sewage.

Of the 17 municipal sewage treatment plants, only four are considered to be satisfactory with relation to capacity. All 17 of the treatment plants are satisfactorily operated.

One new plant was placed in operation in 1947 to serve a population of 5,000. Another plant to serve 640 persons was placed in operation in 1948.

Requirements to abate pollution in the area are 16 new municipal plants to serve a population of 196,575, and enlargement or additions to eight existing plants to serve a population of 179,450. No projects are required at four municipalities, having a population of 10,300. The requirements for one municipality are undetermined. Treatment requirements at eight industrial plants are undetermined.

Plans are under preparation at three municipalities for construction of treatment plants and one plant is presently under construction. No formal action has been taken with 21 other municipal and eight industrial polluters.

Table C_{42}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	14	184,650
Secondary	3	3	10,350
No treatment	**12	—	191,725

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in primary treatment.

Table D_{42}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	1	0	1	0
Textile mill products.....	1	0	1	0
Paper and allied products.	1	0	1	0
Chemical and allied products................	1	0	1	0
Products of petroleum and coal...............	5	0	5	0
Total................	9	0	9	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{42}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	17	4	12	1	17	0	0
Industrial	0	—	—	—	—	—	—

Table F_{42}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	1	5,000	0	--
1948	1	640	0	--
1949	0	--	0	--

Table G_{42}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**16	196,975	--
Enlargement or additions to existing plant	8	179,450	--
Replace existing plant	0	--	--
No project required	4	10,300	[2]1
Undetermined	[1]1	--	8

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Includes one municipality with no treatment requiring two new plants. Due to local conditions three municipalities with plants classified as unsatisfactory are considered to require new plants rather than replacements.

[1] Project requirements for one plant classified as unsatisfactory in capacity have not been determined.

[2] Due to local conditions one industry without waste treatment is classified as requiring no project since the disposal of its waste is considered satisfactory at the present time.

Table H_{42}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	21	8
Abatement ordered	0	0
Plans under preparation	3	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	1	0
Status undetermined	0	0

Table I_{42}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Albertsville (Mill village)...	700	Addition to plant	—
Bessemer:			
Coal products industry......	153,000	Undetermined	—
Birmingham:			
Iron and coal products industries................	27,700	Undetermined	—
Meat packing plant..........	750	Undetermined	—
Carbon Hill....................	1,100	Addition to plant	—
Cordova........................	600	New plant	—
Mill village................	500	New plant	—
Cullman........................	3,500	New plant	Under construction
Eutaw..........................	800	New plant	—
Gorgas.........................	400	Undetermined	—
Greensboro.....................	800	Addition to plant	—
Haleyville.....................	550	New plant	—
Holt (Mill village)............	350	New plant	—
Coal products industry......	13,000	Undetermined	—
Jefferson County:			
Ensley plant................	160,000	Additions to plant	Plans under preparation
Tarrant City plant..........	15,000	Additions to plant	Plans under preparation
Valley Creek outfall........	145,000	New plant	Plans under preparation
Moundville.....................	550	Additions to plant	—
Northport (1)..................	1,700	New plant	—
(2)..................	300	Additions to plant	—
State Negro Colony..........	225	New plant	—
State Colony For Boys.......	200	New plant	—
Parrish........................	800	New plant	—
Tarrant City:			
Coal by-products industry...	37,500	Undetermined	—
Tuscaloosa (1).................	25,000	New plant	—
(2).................	12,000	New plant	—
Bryce Hospital..............	3,700	New plant	—
Mill village................	1,000	Additions to plant	—
Partlow School..............	500	New plant	—
Chemical industry...........	1,800	Undetermined	—
Paper mill..................	18,000	Undetermined	—
Petroleum products industry.	1,800	Undetermined	—
Uniontown......................	1,150	New plant	—

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industries.

LOWER TOMBIGBEE RIVER SUB-BASIN

General Description

The Lower Tombigbee Sub-Basin is bounded on the north by the Warrior River and Upper Tombigbee River Sub-Basins, on the east by the Alabama River Sub-Basin, on the west by the Pascagoula River Sub-Basin, and on the south by the Mobile Bay Sub-Basin. The main river is formed by the confluence of the Upper Tombigbee and Warrior Rivers at Demopolis, Ala. The river flows in a southerly direction for approximately 180 miles to its junction with the Alabama River, forming the Mobile River. The Lower Tombigbee Sub-Basin comprises approximately 4,447 square miles, of which 3,917 square miles are in western Alabama and about 530 square miles in eastern Mississippi.

The area is relatively flat with few rolling hills. The slope of the river is quite flat and decreases to its confluence with the Alabama where the effect of the two-foot tide of Mobile Bay is noticeable at low stages of the river.

The mean annual rainfall varies from about 55 inches at Demopolis, Ala. in the northern part of the sub-basin to 62 inches in the south. A 19-year record at the U.S. Geological Survey gage located at Leroy, Ala., indicates an average discharge of 26,250 cubic feet per second. The maximum recorded flow at this point was 192,000 cubic feet per second. Minimum flows have not been established but have been estimated at 50 cubic feet per second. The mean annual temperature of the sub-basin is approximately 64°F., and the average number of frost free days is about 230.

The population of the Lower Tombigbee River Sub-Basin was 118,860 based on the 1940 census. The preliminary 1950 census indicates that the population has decreased to 103,158.

Economic Development

There are 15 incorporated communities in the Alabama part of the sub-basin and two additional incorporated towns in Mississippi. Urban population is confined to two municipalities in Alabama having a combined population of 8,048. These urban centers are Demopolis and Jackson, Ala. The population decrease of the sub-basin has been in the rural areas.

The principal natural resources of the Lower Tombigbee Sub-Basin are its timber supply, a limited amount of oil, and fertile soils. The sub-basin is mainly an agricultural area and the major products are cotton, corn, hogs and cattle. The northern counties are partially in the Black Belt soils area, which is especially suitable for cattle production.

The major industry in the area is lumbering, together with its associated activities. Choctaw County, Alabama, contains some 35 producing oil wells.

Use of Water Resources

With the exception of small portions located in the extreme northern part of the sub-basin, the area is abundantly supplied with both ground and surface water. There are 14 public water supplies in the sub-basin, 11 of which are obtained from underground sources. Underground sources supply over 80 percent of the total population served by public water supplies. The three public water supplies in Sumter County, Alabama are obtained from surface streams. A large part of the water for livestock purposes is obtained from farm ponds.

Due to its remoteness from centers of population, the river and its streams have not been developed as recreational areas. Some swimming and fishing are carried on in the streams located in the various communities. Commercial fishing is rather extensive on the main river.

The Lower Tombigbee is used for transportation purposes. A nine-foot navigation channel is maintained throughout the length of the river by four low lift locks and dams. This channel makes possible navigation from the Mobile area to the Birmingham industrial region.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{43} through I_{43}, inclusive.

There are nine sources of municipal pollution in the Lower Tombigbee River Sub-Basin, all located in the State of Alabama. The sewered population of these nine communities is 9,310. The amount of pollution discharged to watercourses in terms of equivalent number of people is reduced to 8,650 by treatment at four municipalities with five primary treatment plants. These five plants serve a population of 1,960.

There is one source of industrial pollution producing organic wastes with a population equivalent of 800. This food and kindred products industry has no treatment facility for its waste.

Of the five municipal sewage treatment plants three are inadequate with respect to design capacity and the capacity of two is undetermined. Two of the municipal plants are operated satisfactorily and adequacy of operation at three has not been determined.

No municipal or industrial waste treatment plants were constructed in the sub-basin during 1946 through 1949.

Four new plants to serve a population of 5,650, four additions to existing plant to serve a population of 1,810, and one replacement of existing plant to serve 150 persons is required to abate the pollution of the sub-basin. Two of the enlargements are for one municipality. The requirements for one municipality and the one industrial plant in the sub-basin that discharges waste directly to a watercourse are undetermined.

No formal action has been taken with the ten municipalities or one industry contributing waste to watercourses of the Lower Tombigbee River Sub-Basin.

Table A_{43}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people) **
Having data on pollution load discharged to watercourse	9	9,310	8,650
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	Not applicable
Total	9	9,310	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{43}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	1	800
Producing organic wastes	0	Undetermined
Producing inorganic wastes	0	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	1	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{43}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	4	5	1,960
Secondary	0	--	--
No treatment	5	--	7,350

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{43}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	1	0	1	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{43}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	5	0	3	2	2	0	3
Industrial	0	—	—	—	—	—	—

Table F_{43}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	—	0	—
1947	0	—	0	—
1948	0	—	0	—
1949	0	—	0	—

Table G_{43}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	4	7,350	--
Enlargement or additions to existing plant	**4	1,810	--
Replace existing plant	***1	150	--
No project required	--	--	--
Undetermined	1	1,700	1

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**One municipality requires additions to two plants, one of which has been classified as unsatisfactory and the other as undetermined in capacity.

***Due to local conditions one municipality with a plant classified as undetermined in capacity has been considered to require a replacement.

Table H_{43}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	10	1
Abatement ordered	0	0
Plans under preparation	0	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

Table I_{43}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served **	Project requirements	Remarks
ALABAMA			
Bellamy	150	Replace existing plant	--
Butler	375	Addition to plant	--
Demopolis	1,650	New plant	--
Cheese factory	800	Undetermined	--
Grove Hill	600	Addition to plant	--
Jackson	1,700	Undetermined	--
Linden	835	Additions to plants (2)	--
Livington	1,600	New plant	--
Thomasville	1,300	New plant	--
York	1,100	New plant	--
MISSISSIPPI			
None	--	--	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

MOBILE BAY AREA SUB-BASIN

General Description

The Mobile Bay Area Sub-Basin comprises 1,592 square miles of lowland, coastal and tidal areas. The sub-basin is bounded on the north by the Alabama and Tombigbee River Sub-Basins, on the east by the Perdido drainage area, on the west by the Pascagoula River Sub-Basin and on the south by the Gulf of Mexico. The main tributary streams of the bay are the Mobile and Tensaw Rivers. These rivers are formed by the junction of the lower Tombigbee and Alabama Rivers approximately 45 miles above Mobile. The Mobile River ranks eighth among the large rivers of the United States in order of average discharge at the mouth. Other major tributaries draining the Mobile Bay Area Sub-Basin are the Apalachee and Blakeley Rivers. Included also are streams which drain into Bon Secour Bay and the Gulf of Mexico from Gulf Shores to Ft. Morgan, and Mississippi Sound.

Ground elevations of the area are low and tidal effect occurs in the tributary streams to the bay and at the source of the Mobile River.

The climate of the area is influenced by proximity to the Gulf of Mexico. The mean annual temperature is approximately 67° F. and the number of frost free days varies from 250 to 300 days. Mean annual rainfall varies from 62 to 66 inches.

The population of the sub-basin in 1940 was 153,696, and the preliminary 1950 census indicates the population to be about 224,000.

Economic Development

The preliminary 1950 census shows the urban population of the area to be about 154,325, which is distributed between Mobile and Pritchard.

The sub-basin is, in main, an industrial area. The major industries are ship building and repairing, paper, lumbering, together with its associated activities, wood preserving, meat packing, and the manufacture of chemicals. The operation of the State docks and ship terminals is a major activity in the Mobile area. The major agricultural products are truck crops and cattle, which are confined to the southern portions of Mobile and Baldwin counties. Commercial fishing and harvesting of shell fish are carried on rather extensively in the bay and coastal areas. All the population of Dauphin Island and practically the entire population of the extreme southern portions of the bay area obtain their livelihood from fishing, oystering, and associated activities. A large tourist trade exists in the area.

Use of Water Resources

There are four public water supplies in the sub-basin, two of which are obtained from surface sources. These two, for Mobile and Pritchard, are obtained from Three Mile and Eight Mile Creeks. The present supply for Mobile is rather limited and construction is in progress to develop another source of supply on Big Creek, which is located in the Pascagoula River Sub-Basin. The reservoir on Big Creek will supply water for both domestic and industrial purposes.

Mobile is one of the largest ports on the Gulf Coast and shipping is a major industrial activity. The Mobile River serves as a waterway for inland navigation on the Lower Tombigbee, Warrior, and Alabama Rivers.

The eastern shore of Mobile Bay, Bon Secour Bay, Ft. Morgan Peninsula, Portersville Bay and Dog River have been highly developed as recreational areas.

Commercial fishing is a major activity in the Mobile Bay and Coastal areas. Practically all of the oysters harvested in Alabama waters come from Bon Secour Bay, the Cedar Point and Dauphin Island areas, and Portersville Bay.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{44} to I_{44}, inclusive.

Six municipal sources of pollution, having a population of 129,800 served by sewer systems, contribute pollution to watercourses in the sub-basin. This amount of pollution is reduced to a population equivalent of 118,475 by treatment in four primary and one secondary treatment plants which serve a population of 32,600.

There are seven industrial sources of pollution discharging wastes directly to watercourses of the area. Five of these produce organic wastes amounting to a population equivalent of 76,200. The amount of pollution discharged to a watercourse by one industry producing organic wastes is undetermined. One industry produces inorganic wastes.

Certain waters in the Mobile Bay Area Sub-Basin have been closed to the harvesting of oysters due to pollution.

There are no treatment facilities provided at any of the seven industrial establishments discharging wastes directly to watercourses of the sub-basin. Of the five municipal treatment plants in the sub-basin two are considered to be satisfactory with reference to capacity and four satisfactory with respect to operation.

In 1949 two sewage treatment plants were completed to serve a combined population of 35,000.

Requirements for waste treatment plants to abate pollution in the Mobile Bay area are three new municipal plants to serve a population of 97,200, one addition to an existing plant to serve 2,900 persons, and one replacement to serve 10,300 people. Waste treatment requirements of the seven industries are undetermined.

One new plant and an addition to one plant are under construction. These two facilities will serve a population of 5,100. No formal action has been taken with the three remaining sources of municipal pollution. No action to abate pollution has been taken with the seven industrial establishments discharging wastes directly to watercourses of the sub-basin.

Table A_{44}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	6	129,800	118,475
Having population data available (Data on pollution load to watercourse incomplete or not available)	0	--	Not applicable
Total	6	129,800	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{44}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	5	76,200
Producing organic wastes	1	Undetermined
Producing inorganic wastes	1	Not applicable
Producing wastes of undetermined type	0	Undetermined
Total	7	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C_{44}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	4	4	31,100
Secondary	1	1	1,500
No treatment	**3	—	97,200

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**One municipality also included in secondary and primary treatment.

Table D_{44}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having: Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	2	0	2	0
Paper and allied products.	4	0	4	0
Miscellaneous.............	1	0	1	0
Total.................	7	0	7	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{44}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to: Capacity			Operation		
		Satis-factory	Unsatis-factory	Unde-termined	Satis-factory	Unsatis-factory	Unde-termined
Municipal	5	2	3	0	4	1	0
Industrial	0	--	--	--	--	--	--

Table F_{44}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	2	35,000	0	--

Table G_{44}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**3	97,200	--
Enlargement or additions to existing plant	1	2,900	--
Replace existing plant	1	10,300	--
No project required	***3	19,400	--
Undetermined	0	--	7

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**One municipality requiring a new treatment plant for part of its sewage has two plants of satisfactory capacity classified as requiring no project.

***Due to local conditions one municipality with a plant classified as unsatisfactory in capacity has been considered to require no project since the disposal of its wastes is satisfactory at the present time.

Table H_{44}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	3	7
Abatement ordered	0	0
Plans under preparation	0	0
Final plans approved	0	0
Construction awaiting financing	0	0
Under construction	2	0
Status undetermined	0	0

Table I_{44}. Project list - municipalities and industries requiring improvements for abatement of pollution, July 1, 1950*

Name	Population served**	Project requirements	Remarks
ALABAMA			
Chickasaw	10,300	Replace existing plant	--
Fairhope	2,900	Addition to plant	Under construction
Mobile	85,000	New plant	--
Dairy products	Not known	One undetermined	--
Miscellaneous	11,300	One undetermined	--
Paper mills	68,600	Four undetermined	--
Mt. Vernon:			
Searcy Hospital	2,200	New plant	Under construction
Prichard	10,000	New plant	--
Packing plant	7,500	Undetermined	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

PASCAGOULA RIVER SUB-BASIN

General Description

The Pascagoula River Sub-Basin lies in southeastern Mississippi and southwestern Alabama. It comprises approximately 11,635 square miles, of which 10,892 are in Mississippi and 743 are in Alabama. The Pascagoula River is formed near the center of the sub-basin in the northern part of George County, Mississippi, by the confluence of the Leaf and Chickasawhay Rivers, both of considerable size. Another major tributary, is the Escatawpa River which rises in Alabama and enters the estuary of the Pascagoula.

Topographically, the area may be divided into the lowlands forming a narrow belt three to five miles wide along the Gulf Coast, and the uplands with elevations up to 600 feet above sea level, which comprise the remainder of the sub-basin. The slopes of the streams are very flat. A considerable mileage of coast on Mississippi Sound, an arm of the Gulf of Mexico, is included in this sub-basin. This coastline is broken by Bay St. Louis, Biloxi Bay, and the mouths of numerous short coastal streams.

The mean annual rainfall varies from 53 inches in the northern part of the area to 71 inches at Biloxi on the coast, and is distributed fairly evenly throughout the seasons. A 16-year record of the U.S. Geological Survey gauge at Merrill, Miss. on the main stem of the Pascagoula River, having a drainage area of 6,600 square miles, shows the average discharge of the river at this point to be 9,881 cubic feet per second. The maximum flow recorded was 154,000 cubic feet per second and the minimum was 696 cubic feet per second.

The climate is mild. The mean annual temperature in the upper portion of the sub-basin is about 64° F. and 68.2° F. along the coast. The number of frost free days varies from 230 to 290. Storms originating in the Gulf of Mexico are not uncommon along the coastal area.

The population of the watershed in 1940 was approximately 404,139, of which about one-third were urban. The preliminary 1950 census indicates a population in the sub-basin of 508,152.

Economic Development

In 1950 there were 15 urban communities in the area, all in Mississippi, having an estimated total population of 206,690. The population of the coastal resort centers is considerably increased during the winter months as a result of a large tourist influx.

The sub-basin is primarily one of agriculture, although industry is of growing importance. The land along the coast is especially suited for raising truck crops and fruits. Chief agricultural products are cotton, corn, pecans, peanuts, fruits, forest products, tung nuts, and cattle.

Approximately 40,000 persons are employed in industries of the sub-basin. The principal industries, based on the number of persons employed, are listed as follows in order of importance: lumber and wood products, paper and allied products, fruit and kindred products, apparel and other fabric products, transportation equipment, chemical and allied products, and textile mill products. Petroleum oil development was begun in 1944, and since then a number of fields have been located and partially developed.

The chief means of livelihood for the coastal areas are the seafood industries and the tourist trade. Numerous sea food receiving and packing plants are located in these Gulf coast ports. Biloxi ranks first among Gulf coast ports in the production of sea food.

Use of Water Resources

The area is well supplied with both surface and ground waters. Artesian wells are widely used for municipal public water supplies. Meridian, Miss., has the only surface public water supply in the sub-basin. In the upland portion of the sub-basin both domestic and industrial water supplies are obtained from deep wells.

Important uses of the Pascagoula River and its tributaries are boating, fishing and hunting. Bay areas along the coast are used for numerous recreational purposes. The lower reaches of the Pascagoula River are used for navigation.

Gulf coast waters are important as a source of oysters, shrimp and crabs which are taken commercially. Commerce in Biloxi Harbor averages 182,100 tons annually and consists principally of oysters, shrimp, petroleum products, ice, and pulp wood.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements, are shown in tables A_{45} through I_{45}, inclusive.

There are 25 municipal sources of pollution in the sub-basin, of which one is in Alabama. The population served by these 25 municipal sewerage systems is 188,700.

Twenty-six industries in the sub-basin discharge their waste directly to watercourses of the sub-basin. Fifteen of these produce organic wastes, ten produce inorganic wastes, and the wastes produced by one is undetermined.

No detailed survey has been made of the Pascagoula River and its tributaries. However, it is known that excessive pollution, both domestic sewage and industrial waste, is discharged into Sowashee Creek at Meridian and Tallahala Creek at Laurel, Miss. Certain areas at the mouth of the Pascagoula River have been closed to commercial shellfishing because of pollution carried to the Gulf by the streams.

Bayou Bernard which empties into Back Bay at Biloxi receives sufficient amounts of industrial waste and domestic sewage to destroy the fish life periodically. This pollution is carried down stream into Biloxi Bay.

Primary treatment plants at eight municipalities serve a population of 27,100 and nine municipalities have secondary treatment plants with a connected population of 35,400. One of these municipalities has secondary treatment for only a portion of the total sewage discharged by the city. No treatment is given at an additional eight municipalities. The total population served by collection systems with no treatment is 126,200.

Of the 26 industries in the sub-basin discharging wastes directly to watercourses, one has installed extensive waste treatment works and three others have provided impounding facilities which remove a considerable amount of the pollution going to the streams of the sub-basin.

Of the 17 municipal treatment facilities in the sub-basin, ten are considered to have adequate capacity. Fifteen are adequate with relation to operation.

In 1949 one new municipal sewage treatment plant, to serve 1,000 persons, was placed in operation. Four industrial waste treatment plants were also completed in that year.

Municipal requirements for pollution abatement in the sub-basin include ten new treatment plants to serve a population of 123,400, enlargement of one plant serving 20,000 persons, and the replacement of one existing plant having a connected population of 800. Requirements for 25 industrial establishments discharging directly to watercourses are undetermined. No projects are required for 14 municipalities having a total population of 44,500 and one industrial plant.

Final plans have been approved for one municipal sewage treatment plant designed to serve 35,000 persons. No formal action has been taken with 11 municipal and 25 industrial polluters within the sub-basin.

Table A_{45}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	1	800	525
Having population data available (Data on pollution load to watercourse incomplete or not available)	24	187,900	Not applicable
Total	25	188,700	--

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{45}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	15	Undetermined
Producing inorganic wastes	10	Not applicable
Producing wastes of undetermined type	1	Undetermined
Total	26	--

*Industries having separate outlets and discharging wastes directly to watercourse.

Table C45. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	8	8	27,100
Secondary	9	9	35,400
No treatment	**9	--	126,200

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes one municipality reported in two classifications.

Table D45. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products.	8	0	8	0
Textile mill products.....	2	0	2	0
Paper and allied products.	3	1	2	0
Chemicals and allied products................	12	3	9	0
Miscellaneous.............	1	0	1	0
Total.................	26	4	22	0

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E45. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	17	10	7	0	15	2	0
Industrial	4	1	0	3	1	0	3

Table F_{45}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	0	--
1948	0	--	0	--
1949	1	1,000	*4	--

*4 industrial waste treatment plants for which the amount of waste treated is not known.

Table G_{45}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**10	123,400	--
Enlargement or additions to existing plant	1	20,000	--
Replace existing plant	1	800	--
No project required	***14	44,500	1
Undetermined	0	0	25

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions five municipalities with plants classified as unsatisfactory in capacity have been considered to require new plants rather than replacements.

***One municipality with satisfactory treatment for a part of its sewage, and without treatment for the remainder, is classified as requiring no projects at the present time. Three other municipalities without treatment facilities are also classified as requiring no project since the disposal of their wastes is considered satisfactory at the present time.

Table H_{45}. Status of treatment works project to abate pollution, July 1,1950

Status of project	Number	
	Municipal	Industrial
No formal action	11	25
Abatement ordered	0	0
Plans under preparation	0	0
Final plans approved	1	0
Construction awaiting financing	0	0
Under construction	0	0
Status undetermined	0	0

Table I_{45}. Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
ALABAMA			
Citronelle	800	Replace existing plant	--
MISSISSIPPI			
Decatur	500	New plant	--
Ellisville	1,400	New plant	--
Gulfport:			
Drug and medicine manufacturing	Not known	Undetermined	--
Creosoting plant	Not known	Undetermined	--
Fertilizer plant	Not known	Undetermined	
Naval stores manufacturing	Not known	Undetermined	--
Hattiesburg	40,000	New plant	--
Creosoting	Not known	Undetermined	--
Explosives manufacturing	Not known	Undetermined	--
Fertilizer plant	Not known	Undetermined	--
Naval stores manufacturing	Not known	Undetermined	--
Kreeole:			
Pulp, paper, paperboard mill	Not known	Undetermined	--
Laurel	35,000	New plant	Final plans approved
Canning plant	Not known	Undetermined	--
Packing plants	Not known	Two undetermined	--
Naval stores manufacturing	Not known	Undetermined	--
Magee	1,000	New plant	--
Meridian	40,000	New plant	--
Canning plant	Not known	Undetermined	--
Creosoting plant	Not known	Undetermined	--
Dairy plant	Not known	Undetermined	--
Packing plants	Not known	Two undetermined	--
Pulp, paper, paperboard mill	Not known	Undetermined	--
Textile mills	Not known	Undetermined	--
Moss Point:			
Fish meal, oil manufacturing	Not known	Two undetermined	--
Newton	2,000	New plant	--
Pascagoula	20,000	Enlarge existing plant	--
Fisheries	Not known	Undetermined	--
Shipyards	Not known	Undetermined	--
Richton	800	New plant	--
Stonewall:			
Textile mill	Not known	Undetermined	--
Union	1,500	New plant	--
Waynesboro	1,200	New plant	--

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

PEARL RIVER SUB-BASIN

General Description

The Pearl River Sub-Basin is a long narrow basin approximately 175 miles in length and 35 miles wide. It is bounded on the north and east by the Upper Tombigbee River Sub-Basin and the Pascagoula River Sub-Basin, on the west by the Mississippi River Sub-Basin and drainage to Lake Pontchartrain in Louisiana. The Pearl River is formed in the central part of Mississippi by the convergence of Tuscolameta and Lobutcha Creeks with Yokahockany River. The main stem of the river flows in a southerly direction into the Gulf of Mexico. The lower portion of the stream serves as a boundary between Louisiana and Mississippi.

The total area of the sub-basin is estimated at 8,943 square miles, of which 8,134 are in Mississippi and 809 are in Louisiana.

The upper portion of the sub-basin is hilly. These hills of the upper reaches rise to an elevation in excess of 400 feet. The lower portion of the sub-basin is very flat.

In general river slopes are relatively flat, but at one point in Leake County, Miss., a small natural waterfall exists along with the convergence of adjacent hills. This site is suited for dam construction.

The mean annual rainfall varies from about 53 inches in the upper portion of the sub-basin to 63 inches along the Gulf coast. A ten-year record at the U. S. Geological Survey gauge at Bogalusa, La., having a drainage area of 6,630 square miles, shows the minimum flow recorded at this point to have been 1,290 cubic feet per second.

The mean annual temperature varies from 64°F. in the northern portion of the sub-basin to 68°F. along the Gulf coast. Storms originating in the Gulf of Mexico are not uncommon in the lower portion of the sub-basin.

The 1940 population of the sub-basin was 408,338, of which about 27 percent was classified as urban. The preliminary 1950 census indicates the sub-basin population to be 439,123 with an increase in urban population to 36 percent.

Economic Development

There are ten urban communities in the Pearl River Sub-Basin, of which one is in Louisiana, and nine in Mississippi. The 1950 estimated population for the urban communities is 276,095.

The chief agricultural products of the area are cotton, corn, hay, tung nuts, cattle, and dairy products. Lumbering, manufacturing, and oil and natural gas production are among the industrial pursuits of the sub-basin. The oil and gas fields have been developed in the southern portion of the sub-basin within the past few years.

Use of Water Resources

There are 32 municipal public water supplies in the sub-basin. The city of Jackson, Miss., is the only municipality using surface water as a source of supply.

The other uses of the stream in the sub-basin are recreational--chiefly fishing, hunting, and boating. There is some commercial fishing on the larger streams in the sub-basin. Tributary streams supply water for livestock.

Pollution and Pollution Control

Available data regarding sources and amounts of domestic and industrial pollution, existing treatment facilities and treatment plant requirements are shown in tables A_{46} through I_{46}, inclusive.

There are seventeen municipal sources of pollution in the sub-basin, having a total sewered population of 159,500. Of these municipalities, thirteen have primary treatment facilities serving a population of 21,500 and one has a secondary treatment plant serving a population of 8,000. The population at three municipalities having no treatment is 130,000.

Eight industries in Mississippi discharge pollution directly to watercourses of the sub-basin without treatment. One other satisfactorily treats its wastes by lagooning. There are an additional 12 industries of the type normally considered to discharge waste with polluting characteristics located in the Louisiana portion of the sub-basin. These Louisiana industries may or may not have separate outlets discharging directly to watercourses. The character of the wastes from 13 of the 21 industries of the sub-basin is undetermined. The one industry mentioned above impounds its acid wastes during periods of low stream flow. The wastes are released from the impoundages during high flows. No waste treatment facilities are reported at the other industrial establishments in the sub-basin known to discharge wastes directly to watercourses.

Eleven of the 14 municipal sewage treatment plants are inadequate with relation to capacity. Operation at three municipal treatment plants is unsatisfactory.

During the period 1946 through 1949 one municipal sewage treatment works was completed in Mississippi to serve a population of 5,000, and the one industrial waste treatment facility was enlarged and improved.

Projects to abate pollution of the streams of the sub-basin include eight new plants to serve 129,800 persons and replacement of one existing plant serving a population of 8,000. No projects are required at eight municipalities having a total population of 21,700. Requirements for waste treatment at the twenty industrial establishments are undetermined.

Final plans have been approved for one treatment plant and one plant is under construction in Mississippi. No formal action has been taken with the remaining seven municipalities requiring treatment projects to abate pollution. No formal action has been taken with the eight industrial establishments in Mississippi in regard to abatement of pollution from their industrial wastes. The status of projects for industrial waste treatment in Louisiana are undetermined.

Table A_{46}. Sources of pollution, municipal

Municipalities*	Sources of pollution (in number of municipalities)	Population served by sewerage system	Amount of pollution discharged to watercourse (in terms of equivalent number of people)**
Having data on pollution load discharged to watercourse	2	14,000	10,650
Having population data available (Data on pollution load to watercourse incomplete or not available)	15	145,500	Not applicable
Total	17	159,500	—

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

**Includes industrial wastes discharged into municipal sewerage systems.

Table B_{46}. Sources of pollution, industrial*

Industries	Sources of pollution (in number of plants)	Amount of pollution discharged to watercourse (in terms of equivalent number of people)
Producing organic wastes	0	--
Producing organic wastes	2	Undetermined
Producing inorganic wastes	6	Not applicable
Producing wastes of undetermined type	**13	Undetermined
Total	21	--

*Industries having separate outlets and discharging wastes directly to watercourse.

**Includes twelve industries (only those types normally considered to discharge wastes with pollution characteristics) located in the Louisiana portion of the sub-basin, which may or may not have separate outlets. Information obtained from "Industrial Directory" prepared by the Department of Commerce and Industry of the State of Louisiana.

Table C_{46}. Existing treatment facilities, municipal

Degree of treatment provided	Number		Population served
	Municipalities*	Plants	
Primary	13	13	21,500
Secondary	1	1	8,000
No treatment	3	—	130,000

*Includes incorporated or unincorporated municipalities; other legal bodies as sanitary districts, counties, towns; significant institutions, resorts, recreational centers, or other population centers, and industries discharging sanitary sewage wastes directly to watercourse.

Table D_{46}. Existing treatment facilities, industrial*

Type industry	Number of plants	Number of industrial plants having:		
		Treatment facilities	No treatment facilities	Undetermined facilities
Food and kindred products..	8	0	2	6
Textile mill products......	1	0	1	0
Paper and allied products..	1	--	--	1
Lumber and wood products...	1	--	--	1
Chemical and allied products.............	7	1	4	2
Products of petroleum......	1	0	1	0
Primary metals products....	1	0	1	0
Miscellaneous..............	1	--	--	1
Total..................	21	1	9	11

*Industries having separate outlets and discharging wastes directly to watercourse.

Table E_{46}. Adequacy of existing treatment facilities

Existing treatment facilities	Number	Adequacy with relation to:					
		Capacity			Operation		
		Satisfactory	Unsatisfactory	Undetermined	Satisfactory	Unsatisfactory	Undetermined
Municipal	14	3	11	0	11	3	0
Industrial	1	1	0	0	1	0	0

Table F_{46}. Progress in pollution abatement

Year	Municipal		Industrial	
	Plants completed	Design population	Plants completed	Amount of wastes treated (in terms of equivalent number of people)
1946	0	--	0	--
1947	0	--	*1	Not known
1948	0	--	0	--
1949	1	5,000	0	--

*Enlargement and improvement of existing facility.

Table G_{46}. Requirements for municipal and industrial waste treatment plants*

Requirements	Municipal		Industrial
	Number	Population served by facilities	Number
New plant	**8	129,800	--
Enlargement or additions to existing plant	0	--	--
Replace existing plant	1	8,000	--
No project required	***8	21,700	1
Undetermined	0	--	20

*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Due to local conditions, seven municipalities with plants classified as unsatisfactory in capacity, have been considered as requiring new plants rather than replacements.

***Two municipalities having no treatment facilities and three municipalities with plants classified as unsatisfactory in capacity are classified as requiring no project since the disposal of their wastes is considered satisfactory at the present time.

Table H_{46}. Status of treatment works project to abate pollution, July 1, 1950

Status of project	Number	
	Municipal	Industrial
No formal action	7	8
Abatement ordered	0	--
Plans under preparation	0	--
Final plans approved	1	--
Construction awaiting financing	0	--
Under construction	1	--
Status undetermined	0	12

Table I_{46}.- Project list - municipalities and industries requiring improvements for abatement of pollution*, July 1, 1950

Name	Population served**	Project requirements	Remarks
LOUISIANA			
Bogalusa:			
Chemical products industry..	Not known	Undetermined	—
Creosoted timber products industry..................	Not known	Undetermined	—
Cold storage and ice plant..	Not known	Undetermined	—
Primary metal products industry..................	Not known	Undetermined	—
Paper container manufacturing............	Not known	Undetermined	—
Franklinton:			
Chemical products industry..	Not known	Undetermined	—
Dairy industries............	Not known	Two undetermined	—
Livestock feed products.....	Not known	Undetermined	—
Vegetable cannery...........	Not known	Undetermined	—
Gravel processing plant.....	Not known	Undetermined	—
Mt. Hermon:			
Dairy.......................	Not known	Undetermined	—
MISSISSIPPI			
Brookhaven..................	8,000	Replace existing plant	Under construction
Creosoted timber products...	Not known	Undetermined	—
Petroleum products industry.	Not known	Undetermined	—
Carthage....................	1,400	New plant	—
Columbia:			
Naval stores................	Not known	Undetermined	—
Forest......................	2,500	New plant	—
Hazelhurst..................	2,000	New plant	Final plans approved
Jackson.....................	115,000	New plant	—
Acid products industry......	Not known	Undetermined	—
Kosciusko...................	4,000	New plant	—
Textile manufacturing industry..................	Not known	Undetermined	—
Louisville..................	3,200	New plant	—
Creosoted timber products...	Not known	Undetermined	—
Morton......................	1,200	New plant	—
Pelahatchie.................	500	New plant	—
Picayune:			
Chemical industry...........	Not known	Undetermined	—
Creosote plant..............	Not known	Undetermined	—

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*The needs set forth in this table are based on presently available information. However, future studies and evaluations may result in some changes in these needs.

**Population equivalent for industry.

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